

## THE SCITAMINEÆ OF THE MALAY PENINSULA.

The traveller in the forests of the Peninsula can hardly fail to notice the beauty of many of our wild gingers (*Scitamineæ*) and would be surprised to find how much this interesting group of plants has been neglected by botanists, for though many have received names, but few have been completely described, and the descriptions of Malayan species by Miquel and Blume are often so incomplete that it is impossible to make out what plants they are intended for. Many descriptions have been made from badly dried specimens, and unless special care is taken these plants do not preserve well, for the flowers are thin and fugacious, and the spikes usually full of water, and unless the flowers are dried separately from the spikes they are apt to rot in the press. Very few kinds again have been cultivated in gardens either in the East or in Europe, but those that have, have often been well figured and described. In studying this group here, I have in nearly every case compiled the description from specimens in the jungle itself, or from plants brought home and cultivated in the Botanic Gardens.

The Order consists of five groups, which, beginning with the most specialised, are *Zingiberaceæ*, *Marantaceæ*, *Cannaceæ*, *Lowiaceæ* and *Musaceæ*.

The typical monocotyledonous flower consists of three sepals (calyx) three petals (corolla) six stamens in two whorls and three pistils. In this order the sepals are usually united into a tube and the corolla also forms a tube, with the petals free at the top (corolla lobes.) The stamens in the *Musaceæ* (Bananas) and *Lowiaceæ* are five in number, one being entirely suppressed, or forming part of the lip. In the Arrow-roots, (*Marantaceæ*) only four are developed, one forms the lip, another is spathulate and hooded (the cucullate stamen) a third is flat and resembles a petal (petaloid) and the other is narrow and bears in its edge an anther cell. This curious arrangement is

an elaborate contrivance for insect fertilization which cannot easily be explained without diagrams. In the Cannas (*Cannaceæ*) four of the stamens are petaloid and the fifth bears an anther cell on its edge. These plants are self-fertilized in bud. No Cannas are really wild here but one or two have escaped from cultivation. The *Zingiberaceæ* have a single complete stamen only, the rest being either entirely suppressed except one which forms the lip, or two more may appear as petal-like lobes or horns or teeth, (*Staminodes*). The ovary is three-celled in most of the order, but bears only one style, which is however three-lobed in *Loriaceæ*, showing its origin from three styles. In all the *Zingiberaceæ* but one or two genera, there are at the base of the corolla tube, two small processes, the styloides, which are probably the remains of the other styles, or possibly some of the lost stamens. Their function is apparently to secrete nectar which fills the bottom of the tube. The flowers of nearly all are fertilized by bees, or sometimes flies. The spikes, racemes or panicles are borne on leafy stems or spring directly from the rhizome, the leaves being borne on different stems. As a rule plants growing in dense jungle have the flowers close to the ground on short leafless stems, while those which grow on river banks or open spaces have them on the ends of leafy stems. The fruits of the different groups do not differ much, except in the case of the Musas, which have the well known Banana fruit, the rest have capsules of two or more seeds (in *Donax* there is often but one seed). The seeds are usually enclosed in a sweet aril, and in the *Zingiberaceæ* are usually very aromatic. The fruits are seldom conspicuous, and often only dull green in color. This is especially the case with those which fruit near the ground, the seeds of which are distributed by mice and squirrels who eat the sweet pulp (aril) surrounding the seed. The fruits of some of the terminal spiked species, e.g. *Alpinia*, are orange and showy, and these seeds dispersed by birds.

USES. The *Zingiberaceæ* are nearly all very aromatic, and many have very strongly flavoured root-stocks, which are used as spices. Among these the Ginger, Turmeric, and Zedoary, and Galangal are commonly cultivated here, and many of the wild Globbas, and Amomums are used in native medicine. The

fruits of a few species of *Amomum*, e. g. *A. uliginosum*, are eaten also by Sakais. The buds of *Hornstedtia imperialis* are also popular as curry-stuffs among the Malays, and the fruit of the commonest of our wild plantains, *Musa Malaccensis* is quite eatable, though it is small and full of seed. Indeed I believe that this plant is the parent of several of the local cultivated Pisangs. The wild plantains also give a very good fibre from the leaf sheaths, though it is not by any means as good as that of the Manilla hemp (*Musa textilis*). The stout stems of the Bemban (*Clinogyne*) split up, are used for making baskets, and I found that the leaf stems of the bigger Gingers, (*Hornstedtia*), beaten up and treated with caustic potash, formed a very good paper stuff, and might be used for that purpose, if there was sufficient demand for it.

#### GROUPS.

Fertile stamen one : with two cells. Aromatic. *Zingiberaceæ*.  
                  ,,                with one cell. Not aromatic. *Marantaceæ*.

Fertile stamens 5. Calyx lobes long, lip large, small plants  
*Lowiaceæ*.

                  ,,                Calyx, and corolla sheath-like, lip small,  
very large plants *Musaceæ*.

#### SYNOPSIS OF ZINGIBERACEÆ.

Staminodes broad and petaloid, Spike or panicle terminal.

1. *Globba*. Stamen much longer than the corolla, slender.  
Lip adnate to it above the corolla.

2. *Hedychium*. Stamen long and slender. Lip not adnate above the corolla.

3. *Camptandra*. Stamen short, anther dorsifixed versatile.  
Staminodes much broader than corolla, flat.

4. *Kæmpferia*. Anther cells on a broad thin connective.  
Staminodes much broader than corolla, flat.

5. *Gastrochilus*. Staminodes not broader than corolla lobes.  
Anther thick terminal. Spike terminal or radical cylindric.

6. *Curcuma*. Staminodes not broader than corolla lobes.  
Flowers in a cone-like spike radical.

7. *Conamomum*. Staminodes smaller than corolla lobes,  
anther with long curved arms. Spikes radical.

Staminodes small absent, or adnate to lip.

8. *Costus*. Spikes terminal or radical. Stamen with a thin petaloid filament.

Spikes dense with large persistent bracts. Filament thick.

9. *Zingiber*. Anther with a long curved beak, Lip three-lobed.

10. *Amomum*. Anther with two curved arms, Lip broad.

11. *Hornstedtia*. Anther with no arms, crest small or none, Lip narrow.

12. *Plagiostachys*. Spike lateral from the leafy stem.

13. *Elettariopsis*. Panicle lax creeping from the rhizome.

14. *Geostachys*. Panicle compact erect or pendulous from the rhizome.

15. *Alpinia*. Panicle terminal on a leafy stem.

#### GLOBBA.

This pretty genus is very distinct from all except the Indian *Mantisia*, in the peculiar form of the flowers, which are borne on a long slender panicle with short branches. The calyx is tubular or cup-shaped, the corolla tube usually slender and longer with small boat-shaped lobes reflexed when the flower is open, and a pair of staminodes very similar to the corolla lobes. The lip base is parallel to the erect stamen and its sides joined to it, forming a tube, the limb or free portion is narrow and usually bilobed. The tube contains nectar, and the entrance to it is a slit in front, at the foot of which is usually a brown or violet spot, a guiding mark for the insect visitors. The stamen above the lip is long and slender, and curved over at the top where it bears the oblong anther, which often has one or two pairs of processes at the sides usually flat and linear or triangular (the spurs). The style is long and slender and runs up along the stamen, passing between the anther cells in the usual way. The fruit is a small capsule as big as a pea, which when ripe splits widely open exposing a number of small brown seeds. The flowers are either yellow, or white or violet, and in some cases the bracts are coloured red or yellow, making the plants very showy. Globbas are to be found in all of

our forests on rocks, or in damp spots, often in great abundance. The genus occurs in the Himalayas and Burma, less commonly in other parts of India, and, except for one possibly introduced species, is absent from Ceylon. They are abundant all over the Malay Peninsula and Siam, Sumatra and Borneo, becoming rarer further east.

The species, though somewhat variable, are tolerably easily distinguished and classified, though it is not always easy to identify some of those that have been described on account of the authors having often omitted to describe important parts of the flower. Thus Miquel rarely described the anther-spurs, the best character for classifying the species, while Baker in the Flora of British India while paying due attention to this character lays some stress on the presence or absence of bulbils, which are often produced from the axils of the bracts. This character however is absolutely worthless. Any globba growing in a sufficiently wet spot especially near a stream will produce bulbils sometimes completely replacing the flowers with them. In two species *G. marantina* and *G. bulbilifera* it is true that bulbils are invariably produced in the lower bracts, but all the species may at times bear them also. An important character also is the calyx, and as specimens are often met with in which the corolla is fallen away, this organ which remains on the fruit is very useful in identification. Sometimes it is regular and tubular with three equal points, sometimes dilated upwards or again curved with two large and one small tooth or there may be no trace of teeth or lobes.

Those who have not seen globbas in plenty growing wild might be puzzled by odd forms which sometimes occur in which the inflorescence is borne on leafless stems. Miquel's *G. aphylla* is probably one of these, perhaps a sport of the very common *G. panicoides*. Plants also with branching stems occur, but are much rarer.

#### § APLANTHERA.

**Anthers spurless, Flowers yellow.**

*G. Wallichii* Baker. Flor. Brit. Ind. p. 202.

About 2 feet tall, the lower sheathing leaves dotted with purple pubescent or hispid. Leaves lanceolate acuminate rather

thin in texture about 5 inches long by  $1\frac{1}{2}$  inch wide, upper ones smaller, finely pubescent on both sides, sheaths long about 3 inches hispid, ligule rounded hispid. Panicle long and slender branches distant one inch long. Flowers crowded at the ends few orange. Bracts lanceolate very small. Calyx campanulate with two other long acute lobes and one shorter,  $\frac{1}{8}$  inch long. Corolla tube  $\frac{1}{4}$  inch long, lobes rather short  $\frac{1}{8}$  inch long ovate. Staminodes longer  $\frac{1}{4}$  inch long, linear oblong. Lip short linear entire with a brown central spot. Stamen filament  $\frac{1}{2}$  an inch long, anther  $\frac{1}{8}$  with no margin nor spurs. Capsule globose smooth.

Penang. Banks on Moniot's Road.

*Gl. floribunda*. Baker, p. 203.

Plant 2 feet tall, with oblong leaves nearly a foot long, pubescent, a long lax panicle with many branches 1 to  $1\frac{1}{4}$  inch long, rachis very hairy. Bracts small and deciduous. Corolla pale yellow, lobes oblong, lip long not bifid, anther with a narrow border.

Johore. (King.)

I have never seen this either wild or in Dr. King's collections.

*G. uliginosa*. Miq., Fl. ind. Bat. Suppl. p. 613. Baker. I c. p. 203.

Habit exactly that of *G. panicoides* Miq. Stems tufted 2 feet long, lower sheaths spotted with red. Leaves lanceolate acuminate three inches wide, glabrous above except for some rather long strigose hairs along the nerves, pubescent beneath sheathis hispid. Panicle long and lax with short scattered branches  $\frac{1}{4}$  inch long with 2 or 3 flowers on each. Bracts oblong obtuse green. Calyx funnel-shaped wlth rather long acute lobes  $\frac{1}{8}$  inch long. Corolla tube slender  $\frac{1}{4}$  inch long, lobes ovate oblong, upper one boat shaped  $\frac{1}{2}$  an inch long orange. Staminodes oblong obtuse. Lip very narrow and short bilobed, lobes linear obtuse orange with a black central spot. Filament slender  $\frac{1}{4}$  inch long, anther cells narrow elliptic diverging at base with no margin or processes.

Singapore. Bukit Mandai; Malacca. Alor Gajah.

Perak. Thaiping hills; Gopeng (King). Penang (King) in Fl. Brit. Ind.

This plant is very near *G. panicoides* Miq., differing in the absence of spurs to the anther, and the form of the calyx. It is possible that it is only an abnormal form. The Singapore plant produced leafless or almost leafless stems bearing panicles.

#### § CERATANTHERA.

**Anther 2-spurred. Flower yellow.**

*Gl. panicoides*. Miquel. l.c. 614.

*Gl. Kingii*. Baker. l.c. 204. *G. stenothyrea* Bak. l.c.

Stems tufted, from nine inches to two feet in height usually rather slender, sheaths at the base spotted with red, more or less pubescent. Leaves narrow lanceolate acuminate to ovate acuminate  $1\frac{3}{4}$  inch to 5 inches long and  $\frac{3}{4}$  to one and a half inch broad, ligule hispid. Panicle slender, the branches usually short sometimes rather long spreading. Flowers usually few. Bracts lanceolate green. Calyx short unequally 3 toothed, one tooth much longer than the others, lanceolate blunt, orange  $\frac{1}{8}$  inch long. Corolla tube  $\frac{1}{2}$  inch long, lobes cymbiform  $\frac{1}{4}$  inch long orange. Staminodes rather longer oblong, orange. Lip short oblong bilobed orange with a dark brown central spot. Stamen filament one inch long, anther cells parallel, connective developed all round and at the base prolonged into a pair of subulate spurs. Style longer than the stamen, stigma very small. Capsule globose smooth rounded green  $\frac{1}{4}$  inch long terminated by the enlarged calyx.

Singapore, Bukit Timah and other woods; Muar (Feilding). Malacca, Sungai Hudang; Merlimau. Selangor, Kwala Lumpur, Batang Berjuntai, Petaling. Sungai Ujong; Bukit Tumiang. Perak. Bruas. Dindings. Province Wellesley, Tasek Gelugur. Lankawi, (Curtis 2642) also Lingga island (Hullett). Sumatra on the Kelantan river, Siak. Borneo, Sandakan, Bongaya river, Labuk bay and Sarawak.

This is a very common plant along stream banks and in damp spots in woods all over the Malay Peninsula. It is very variable in size, form of leaf, and length of panicle and its branches. The forms from Sarawak and Sandakan are stout broad leaved forms with branches an inch and a half long, and

longer calyces, but I can only consider them as extreme forms.

I have the authority of Dr. King for identifying *G. Kingii* Baker with the ill-described *G. panicoides* of Miquel of which he has seen a type. It would indeed be strange if so very abundant and conspicuous a plant had escaped Miquel. I cannot from the description distinguish *G. stenothyrsa* Baker. from this plant. It is based on specimens from Tenasserim collected by Parish, and from a plant collected by Cuming in Malacca.

Like all other Globbas, this often produces bulbils in the axils of the bracts, and often the whole panicle produces bulbils instead of flowers.

It is known to the Malays by a variety of names, viz. Haliya hutan (wild ginger), Meroyan Tingal, and Meroyan Br'choin, Pua Birah, Bunga Lidah Munta, Haliya K'ra. The slightly aromatic roots are used in native medicine for fever, and rheumatism.

*G. pendula* Roxb. Asiat. Res. XI. 359 Fl. Ind. 179.

A large plant 3 feet or more tall. Leaves oblong cuspidate 9 inches long, 4 across glabrous, ligule rounded pubescent, sheaths with pubescent edges. Panicle stout sometimes nearly 2 feet long, branches short few-flowered. Bracts lanceolate caducous. Calyx funnel-shaped  $\frac{1}{4}$  inch long, with 3 unequal acute lobes. Corolla tube slender half a inch long, lobes cymbiform  $\frac{1}{4}$  inch long orange yellow.

Staminodes thin oblanceolate obtuse as long. Lip adnate from a little above the staminodes narrow bilobed orange with a maroon central spot nearly  $\frac{1}{2}$  an inch long. Stamen filament over  $\frac{1}{2}$  an inch long, anther elliptic horns linear subulate  $\frac{1}{2}$  about as long as the anther, connective prolonged above the anther into a rounded process.

Penang. Banks close to the Waterfall. Perak on Maxwell's hill. Kedah Peak by the Cascade. Pahang; Tahan river. One of the biggest species. The name *pendula* is by no means a good one, as the stout panicle is usually stiffly erect.

*G. montana* n.sp.

Stems about 2 feet tall. Leaves lanceolate cuspidate thin 7 inches long  $1\frac{1}{2}$  inch broad, with a long attenuate point, glabrous above paler pubescent beneath, petiole short but usually distinct,

ligule rounded pubescent, sheaths very hairy. Panicle long slender 1 to  $1\frac{1}{2}$  foot long, branches 1 to 2 inches long, horizontal rather distant few flowered. Bracts ovate oblong  $\frac{1}{8}$  inch long. Calyx campanulate lobes acute,  $\frac{1}{8}$  inch long. Corolla tube slender  $\frac{1}{2}$  inch long, lobes broadly ovate obtuse  $\frac{1}{4}$  inch long, yellow. Staminodes absent. Lip small free for some distance above the corolla lobes apex rounded almost entire. Stamen, filament above the lip  $\frac{1}{2}$  an inch long, anther small elliptic with large flat triangular wings running the whole length but shorter than the anther.

Kedah Peak, and near the waterfall.

This is a stout plant like *G. pendula* Roxb, but is remarkable in the anther spurs, which form a triangle in the centre of which are the anther cells. The staminodes seem to be entirely wanting.

*Gl. calophylla* n.sp.

Stems over a foot tall fairly stout, lower sheaths spotted red. Leaves oblong lanceolate acuminate with a long point 6 inches long  $1\frac{3}{4}$  inch broad, deep green above with silvery central and lateral bars, glaucous tinted with red beneath, base narrowed into a petiole, glabrous above pubescent especially along the midrib beneath. Panicle 6 inches long branches spreading distant an inch long, many flowered. Bracts broadly oblong ovate  $\frac{1}{6}$  inch long persistent for some time. Calyx tubular campanulate dilated upward  $\frac{1}{8}$  inch long with short lobes. Corolla tube very slender  $\frac{1}{4}$  inch long, lobes boat-shaped broad blunt yellow. Staminodes oblong half as long again as the lobes. Lip short linear apex bifid lobes rounded, orange with no spot. Filament very slender  $\frac{3}{4}$  inch long, anther spurs 2 broad triangular, as broad as the anther at the base. Bulbils sometimes produced.

Siam near Pungah (Curtis No. 3286.)

This pretty plant is noticeable from its ornamenteally colored leaves and botanically it is remarkable for its dilated calyx and its unusually large staminodes and very short narrow lip.

*Gl. malaccensis* n.sp.

Stems 2 feet tall or longer. Leaves broadly lanceolate acuminate rather distant six inches long, 2 across, glabrous,

ligule short rounded pubescent, sheath pubescent, petiole distinct sometimes half an inch long. Panicle short compact on a long peduncle nude except for a few distant bracts, the lowest of which are nearly 2 inches long linear green; branches short about  $\frac{1}{4}$  inch long few flowered. Calyx cylindric with short acute lobes nearly  $\frac{1}{4}$  inch long. Corolla tube very slender  $\frac{1}{2}$  an inch long, lobes ovate boat-shaped less than  $\frac{1}{4}$  inch long yellow. Staminodes oblong obtuse about as long. Lip short linear oblong entire. Anther oblong with two triangular subulate spurs from the centre of the side, filament  $\frac{3}{4}$  inch long. Capsule globose wrinkled  $\frac{1}{4}$  inch long.

Malacca. Woods at the base of Mt. Ophir: Bukit Sedanen. Selangor, Bukit Hitam (Kelsall). Sungai Ujong, Bukit Sulu; Bukit Kandong.

This is called by the Malays, Pua Rimbah, Pua Hudang and Pua Gajah, and is used medicinally in childbirth.

It has the habit of *G. aurantiaca* Miq, but is very much less hairy and has only two spurs on the anther, and the long peduncle with a terminal dense panicle and narrow persistent bracts distinguish it from all others.

*Gl. integra* n.sp.

Stem 3 to 4 feet tall. Leaves oblong lanceolate cuspidate subpetiolate about a foot long and three inches across, the point nearly 2 inches long, glabrous above minutely pubescent beneath, ligule rounded and pubescent. Panicle about a foot long rather weak, branches  $\frac{1}{2}$  an inch long or less, patent numerous with two or three flowers at the end. Bracts oblong ovate  $\frac{1}{8}$  inch long. Calyx small campanulate  $\frac{1}{8}$  inch long, lobes ovate obtuse. Corolla tube about twice as long, lobes boat-shaped obtuse  $\frac{1}{4}$  inch long orange. Staminodes much smaller oblong. Lip narrow linear obtuse entire. Filament short, anther oblong with a broad triangular wing on each side.

Siam, Bangtaphan, common along Ba Quean stream. (Dr. Keith.)

This species is remarkable for its short flowers, narrow entire lip and broad triangular anther-spurs.

*Gl. Keithii* n. sp.

Leaves narrowly lanceolate cuspidate six inches long about

$\frac{1}{2}$  an inch broad, glabrous, ligule absent. Panicle over six inches long with numerous branches 2 inches long or less with a few flowers at the apex. Bracts linear lanceolate persistent  $\frac{1}{2}$  an inch long. Calyx slender tubular  $\frac{1}{4}$  inch long lobes lanceolate. Corolla tube very long and slender  $\frac{3}{4}$  inch long grey, lobes obtuse boat-shaped less than  $\frac{1}{4}$  inch long yellow. Staminodes lanceolate oblong yellow. Lip long and narrow deeply bilobed lobes rounded. Filament very slender  $\frac{1}{2}$  an inch long, anther elliptic grey with a lanceolate acuminate spur on each side in the upper part of the anther.

Siam. Bangtaphan in Bamboo-jungle. (Dr. Keith.)

The very narrow leaves, and long corolla tube, and the curious anther spurs easily distinguish this plant.

Flowers white or violet.

*G. leucantha* Miq. l. c. 612.

*G. pallidiflora* Bak. l. c. 204.

Rhizome short, roots with tuberous fusiform swellings. Stems about two feet tall, often less. Leaves broadly lanceolate acute, 8 inches long and 3 across, very finely pubescent especially on the under surface, dark green above, purple beneath, sheaths striate hispid usually spotted with purple, ligule short hardly  $\frac{1}{8}$  inch long, rounded hispid. Panicle terminal rarely radical, lax, with spreading branches two inches long. Bracts ovate  $\frac{1}{8}$  inch long. Flowers in threes on the branches, ivory white. Bracts ovate pure white. Calyx tubular with three teeth, two longer than the third,  $\frac{1}{4}$  inch long white shining, minutely pubescent. Corolla tube slender about  $\frac{1}{2}$  an inch long, lobes cymbiform  $\frac{1}{4}$  inch long. Staminodes narrower oblong a little longer. Lip short oblong rounded shortly bilobed, white with a purplish brown spot, (sometimes absent). Stamen nearly one inch long (above the corolla) anther cordate with two slender subulate horns a little longer than it, cells yellowish. Style slender longer than the anther, ovary white pubescent. Styloides cylindrical acute. Capsule globose  $\frac{3}{16}$  inch long polished smooth bright green. Seeds about 8, angled  $\frac{1}{8}$  inch long.

Singapore, common on Bukit Timah, Chan Chu Kang, etc. Pulau Damar, Johore, Tanah Runto; Gunong Pulai; Gunong Panti (King). Perak, Dindings at Lumut.

A very pretty species, the whole of the inflorescence being pure white and much of it polished like ivory. It frequents rather dry parts of woods often growing on rocks. Forms occur in which the leaves on some of the flowering stems are suppressed, the stems being merely covered with sheaths. In one plant the stem bore axillary panicles as well as the terminal one. Bulbils are often to be met with on the lower branches of the panicle but more rarely than in other species.

*Gl. albiflora* n. sp.

Stems three feet tall. Leaves narrowly lanceolate acuminate cuspidate eight inches long, one inch broad, glabrous green with a silvery grey variegation along the midrib when young, ligule very short, sheath glabrous. Panicle 12-15 inches long with distant slender branches spreading, one inch long or less. Bracts persistent linear obtuse nearly  $\frac{1}{4}$  inch long. Flowers white, one or two only on the ends of the branches. Calyx tubular with short lanceolate lobes. Corolla tube very slender  $\frac{1}{2}$  an inch long, lobes boat-shaped ovate. Staminodes longer oblong linear. Lip short obtuse bilobed, lobes rather long divergent. Filament  $\frac{3}{4}$  inch long anther oblong, spurs 2 linear acuminate falcate, longer than the anther.

Penang: Government Hill near the cooly lines (Curtis 2851). A rather slender, narrow leaved plant, remarkable for its long persistent bracts, and long upcurved spurs of the anther.

*Gl. elegans* n. sp.

Stems over a foot tall rather slender. Leaves lanceolate acuminate minutely pubescent beneath, 5 inches long,  $1\frac{1}{4}$  inch wide, ligule and margin of sheath hispid. Panicle erect rather slender with short stiff spreading branches half an inch long. Bracts lanceolate green persistent  $\frac{1}{8}$  inch long. Flowers few crowded at the ends of the branches, white. Calyx unequally 3 lobed, lobes acute,  $\frac{1}{4}$  inch long, Corolla tube nearly  $\frac{1}{3}$  an inch long, lobes, oblong ovate obtuse  $\frac{3}{16}$  inch long. Staminodes very similar and as long, Lip short oblong ovate obtuse entire white with a violet central spot. Filament  $\frac{1}{2}$  an inch long, spurs of anther linear curved up at the ends  $\frac{3}{16}$  inch long, Capsule globose smooth  $\frac{1}{4}$  inch long

Dindings, Woods near Bruas, and Gunong Tungul. (No 8392). This resembles *G. leucantha* Miq., but has smaller nearly glabrous leaves, straight and slender panicle and an entire lip.  
*Gl. violacea* n. sp.

Stems one to two feet tall rather stout. Leaves large or moderate oblong lanceolate acuminate with a long point, covered with scattered strigose hairs on both surfaces, or sometimes only scabrid, 7 to 10 inches long, 2 inches broad, dark green above paler beneath, ligule short rounded very hairy, sheaths with stiff hairs. Panicle of numerous short branches about half an inch long stiff and horizontal. Bracts small ovate lanceolate white. Calyx cylindric with three short points, one shorter than the others, as long as the corolla tube, ivory white. Corolla tube  $\frac{1}{4}$  inch long, lobes ovate boat-shaped violet or white. Staminodes longer and narrower violet,  $\frac{1}{4}$  inch long. Lip very narrow linear grooved nearly the whole way down bilobed, violet or white with a darker spot near the apex, apex yellowish. Stamen long rather stout, anther oblong rather large violet, with two long linear spurs. Capsule smooth globose white dehiscing entirely and exposing a number of ovoid beaked brown seeds.

Johore: Gunong Pulai. Selangor, Bukit Hitam (Kelsall). Perak, Bujong Malacca; Gunong Keledang. Ipoh (Curtis 3316) Gunong Inas (Wray 4164). Dindings.

This is very nearly allied to *G. leucantha*, but the corolla tube is much shorter, and the lip very much narrower. The flowers are sometimes entirely ivory white, at others violet.

#### § MARANTELLA.

**Anther 4 spurred. Flowers yellow.**

*Gl. aurantiaca* Miq. l. c. 613.

Rhizome short. Stems about 18 inches tall, the bases covered with hairy sheaths. Leaves oblong to ovate cuspidate 7 inches long and 3 wide (often much smaller) hairy beneath, sheaths hairy. Peduncle 18 inches or less, hairy. Panicle compact usually short sometimes as much as 8 inches long, branches short  $\frac{1}{4}$  inch long, numerous horizontal, with a few empty bracts at the base and two or more flowers. Bracts orange, oblong obtuse hispid  $\frac{1}{8}$  inch long, lower ones sometimes

bulbilliferous. Pedicels  $\frac{1}{4}$  inch long, pubescent. Calyx funnel-shaped  $\frac{1}{4}$  inch long 3 toothed, teeth short and blunt pubescent. Corolla yellow, tube nearly  $\frac{1}{2}$  an inch long lobes rather large oblong. Lip short broad oblong bilobed orange with a brown central blotch. Staminodes short oblong. Stamen filament slender  $\frac{1}{4}$  inch long, anther oblong with two pairs of triangular teeth. Fruit globose smooth crowned with the long tubular calyx.

Malacca, Brisu (Derry, No 18). Selangor, common, Bukit Hitam; Bukit Kudah. Negri Sembilan, Gunong Berumbun. Perak, Larut Hills. Penang, Moniot's road. This plant, the "Pua Gumbur" of the Malays, is easily recognised by its hairy stem, broad hairy leaves and crowded panicle.

*Gl. perakensis* n. sp.

Stem stout about a foot or a foot and a half tall. Leaves obovate cuspidate broad, narrowed at the base glabrous, 8 inches long by 4 wide, petiole  $\frac{1}{4}$  inch hispid, ligule short oblong rounded. Peduncle 8 inches long with large ovate orange bracts, the lowest an inch long, upper ones smaller oblong obtuse, softly pubescent, edges ciliate. Panicle short an inch long dense, branches about half an inch long pubescent. Bracts short and broad ovate orange. Calyx short tubular  $\frac{1}{8}$  inch long pubescent, orange. Corolla tube twice as long, lobes ovate. Lip short broad oblong bilobed orange with a brown central spot. Staminodes oblong linear obtuse pale orange. Stamen connective of 4 triangular broad spurs. Capsule globose, pustulate, especially when young, orange color.

Perak, Ipoh, Kinta, (Curtis 3141) Rocks on Bujong Malacca.

Allied to *G. aurantiaca* Miq. but less hairy, the peduncle being only softly pubescent; the sheathing leaves on the peduncle are very much larger and broader and the lip shorter and broader almost square in outline.

*Gl. variabilis*. Ridl. Trans. Linn. Soc. Vol. 3. p. 378.

Stems over a foot tall. Leaves ovate or ovate lanceolate acuminate 4 inches long,  $1\frac{1}{2}$  inch broad, glabrous dark green above and purplish beneath. Panicles about 4 or 5 inches long rather compact with short branches. Bracts  $\frac{3}{8}$  inch long oblong

orange or scarlet persistent. Calyx straight lobes acute orange. Corolla tube more than twice as long, lobes oblong, upper one boat-shaped. Staminodes lanceolate oblong shorter. Lip oblong cuneate bilobed broad  $\frac{1}{4}$  inch long orange with a chestnut spot. Filament  $\frac{3}{4}$  inch long, anther with 4 acute spurs the upper ones longest. Capsule subglobose wrinkled.

Pahang Woods near Kota Glanggi and Tahan.

This pretty plant is most closely allied to *G. atrosanguinea* of Borneo, and also to *G. Schomburgkii* Hook, of Siam. Its broad conspicuous orange or red bracts, add much to its beauty and make it a showy plant. The squared lip broadest at the tip resembles that of *G. perakensis* Ridl.

*G. cernua* Baker l. c. p. 205.

Stems several about a foot tall, bases purple. Leaves ovate acuminate cuspidate dark polished green above paler beneath 4 inches long,  $1\frac{1}{2}$  inch broad, petiole  $\frac{1}{4}$  inch long or less, ligule short broad truncate, sheath and midrib pubescent. Panicle short nodding six inches long, rachis pubescent, base nude except for some (about 6) lanceolate acute to oblong bracts, the largest  $\frac{1}{2}$  an inch long; branches short spreading an inch long. Floral bracts ovate oblong  $\frac{1}{4}$  inch long by  $\frac{1}{8}$  inch across persistent green. Flowers sessile clustered at the ends of the branches with one or more ovate yellow bracts. Calyx tubular  $\frac{1}{4}$  inch long equally lobes equal short blunt, yellow. Corolla tube slender pubescent nearly  $\frac{3}{4}$  inch long, light yellow lobes ovate boat-shaped  $\frac{1}{4}$  inch. Staminodes linear oblong rather longer light yellow. Lip short oblong dilated towards the tip, bilobed lobes spreading acute, yellow with a central green spot,  $\frac{1}{4}$  inch long. Filament  $\frac{1}{8}$  inch long yellowish, anther spurs 4 upper ones subulate lower ones broader. Capsule wrinkled green.

Perak: Thaiping hills; Bujong Malacca; Gopeng (King).

This species, which appears to be local, though common on the Thaiping Hills, is easily recognized by its decurved panicles of lemon yellow flowers.

*Gl. brachycarpa* Bak. l. c. c.

Stem  $1\frac{1}{4}$  foot rather slender, sheaths hairy. Leaves ovate acuminate 5 inches long glabrous above, minutely pubescent

beneath, ligule very short glabrous. Panicle short nodding with a few distant short branches, lower bracts ovate lanceolate  $\frac{1}{4}$  inch long green persistent; branches  $\frac{1}{8}$  inch long, flowers 4 or 5 crowded at the ends. Calyx funnel-shaped entire  $\frac{1}{8}$  inch long. Corolla pale yellow, lobes ovate. Lip linear entire with a dark central spot. Anther with 4 equal triangular spurs. Capsule globose pustular.

Perak, Thaiping Hills 2-3000 feet. King (2414). (Curtis 2073).

Nearly allied to the last but distinguished by its broader persistent bracts at the base of the peduncle, and the calyx which is shaped like an old-fashioned conical goblet.

*G. versicolor* Smith. Exot. Bot. t. 117 is mentioned as occurring in the Malay Peninsula by Roxburgh and by Koenig, who collected it in Junk Ceylon, and saw it in a dwarf state near Malacca. (This latter plant was probably *G. panicoides*.) It does not seem to have been seen in our region since.

*G. bulbifera* Roxb. is stated in the Flora of British India to occur in the Malay Peninsula, but I have never seen it in a wild state, nor does it occur in any of the collections.

#### HEDYCHIUM.

*H. longicornutum* Baker. Fl. Brit. India. vi. p. 228.

An epiphytic plant with very thick grey fleshy roots which clasp the branches or stem of a tree. Rhizome short. Stems several about two feet tall, stout. Leaves oblong acuminate glabrous except the margins which are hairy, dark green, purplish beneath, one foot in length and four inches wide, ligule oblong lanceate two inches long, sheath hairy. Flower spike terminal four inches long dense. Bracts lower ones ovate; upper ones narrower lanceolate, one inch or more long covered with brown silky hairs. Buds erect cylindrical acute scarlet. Calyx spathaceous oblique one inch long slender pink. Corolla tube cylindrical slender  $1\frac{1}{2}$  inch long, lobes narrowly linear deflexed red, three inches long by  $\frac{1}{8}$  wide. Staminodes and lip similar linear undulate reflexed orange color,  $1\frac{1}{2}$  inch long  $\frac{1}{4}$  inch wide. Stamen five inches long base stout tapering upwards pinkish at the base white above, anther linear oblong orange  $\frac{1}{8}$  an inch long. Stigma projecting beyond, club shaped. Capsule oblong with

rounded angles dark brown hairy  $1\frac{1}{2}$  inch long, dehiscing into three carpels, recurved bright orange within. Seeds sixteen in each cell, oblong angled  $\frac{1}{4}$  inch long covered with an aril of soft crimson processes.

Johore, near Castlewood. Muar (Fielding). Malacca : Ayer Panas ; Merlimau : Woods at the base of Mt. Ophir, etc., common. Selangor, Gunong Hitam ; Gingting Bidai. Perak, Larut Hills. Patani, Tomoh (Machado). Also Siak in Sumatra.

This very beautiful plant is widely scattered over nearly all of the Peninsula. It is epiphytic, growing usually rather low down on the branches of trees which it clasps with its curious fleshy roots, which resemble those of some orchid. The dense heads of flowers, with the long erect scarlet bands and the yellow recurved staminodes make it a most attractive plant. It is known to the Malays as Tepus Lada, and Ubat Chaching and the roots are used in cases of ear-ache, and as a vermicifuge.

*H. microchilum* n. sp.

Epiphytic glabrous. Stem about 2 feet long  $\frac{1}{4}$  inch thick. Leaves 5 flaccid lanceolate acuminate dark green, tapering towards the base 9 inches long by two wide, ligule papery lanceolate acute  $\frac{1}{8}$  inch long. Raceme cylindric nodding 3 inches long covered with thin sheathing leaves (bracts) each containing 2 flowers. Bracteole exceedingly thin  $\frac{1}{4}$  inch. Calyx thin and papery tubular dilated above, apex acute,  $1\frac{1}{2}$  inch long. Corolla tube slender 2 inches long yellowish white, terete, lobes linear convolute or spirally twisted acute apple green  $\frac{3}{4}$  inch long. Lip very small orbicular retuse white  $\frac{1}{8}$  inch long. Staminodes oblanceolate obtuse white  $\frac{5}{8}$  inch long  $\frac{1}{4}$  inch wide. Stamen very short, filament thick  $\frac{1}{4}$  inch long, orange, anther as long dorsifixured curved, cells linear, with a deep groove between them, orange. Stigma elongate ovoid-triangular with a V shaped ridge at the base, deep green and hairy. Capsule oblong an inch long orange, splitting into three lobes and showing the numerous seeds enclosed in a red aril.

Java. Obtained with *Vanda tricolor* and cultivated. Flowers in August. Absolutely unique in the exceedingly rudimentary lip, and short filament. The plant appeared grow-

ing out of a tuft of *Vanda*, planted on a tree in the gardens.

*H. crassifolium* Baker. Fl. Brit. Ind. p. 228. I know nothing of, nor indeed by the description do I see anything to distinguish it by from *H. longicornutum* except that its bracts are said to be glabrous and not hairy. It was obtained in Perak by Dr. King's collector.

*H. macrorrhizum* n. sp.

Epiphytic, rhizome branched thick resembling that of ginger, forming a large mass on the tree. Roots thick terete. Stems about a foot tall,  $\frac{1}{4}$  inch through. Leaves lanceolate acute glabrous eight inches long by two wide tapering to a short petiole below, ligule short, obtuse. Spike nodding lax about ten inches long. Bracts oblong obtuse one inch long  $\frac{1}{4}$  inch wide about 12, distant green hairy at the base. Flowers two or three in each. Calyx narrow pubescent cylindrical nearly one inch long with two very short teeth. Corolla tube very slender  $1\frac{1}{2}$  inch long, lobes very narrow linear, one inch long. Staminodes similar. Lip narrow deeply bifid, lobes lanceate curved about  $\frac{3}{4}$  of an inch long, all white. Stamen slender  $1\frac{1}{2}$  inch exserted. Anther very narrow linear. Style shorter than the stamen.

Selangor on a lofty fallen tree. Pahang track, 15th mile.

*H. denticulatum* n. sp.

Terrestrial. Stems tufted about two feet tall numerous. Leaves lanceolate acuminate glabrous with small thornlike processes along the edge 8 inches long or more, 3 inches wide, petiole  $\frac{1}{2}$  inch long, sheaths finely hispid ribbed. Panicle terminal about a foot long branches short three flowered. Calyx brown papery tubular unequally bilobed  $\frac{1}{2}$  an inch long. Corolla tube straight cylindric. Dorsal petal narrow linear involute, apex cupshaped, pinkish, lower part green,  $\frac{1}{2}$  an inch long, lateral petals linear spatulate deflexed adnate to the lip at the base. Lip narrowly dilated at the apex and ending in three lobes, the lateral lobes curved forwards, the middle one bifid, all toothed, base of lip channelled, edges thickened red, the rest green. Staminodes narrow linear shorter than the petals red. Stamen long rather thick arched white pubescent nearly twice as long as the upper petal. Anther large oblong, pinkish. Style a little

longer. Capsule globose  $\frac{1}{2}$  an inch long crowned with the calyx.

Dindings in woods at Lumut, abundant flowering in July. This is perhaps the least showy species in the genus, but is not wanting in interest. The peculiar dorsal petal, terminated by a conical cap, the narrow linear lip deeply channelled and ending in a broad three-lobed toothed limb, and the thick arched stamen, make it very distinct from any known species. The flower resembles some curious insect. When dry the leaves are rough and scabrid. The capsule resembles more that of an *Alpinia* than that of a *Hedychium*.

*H. collinum* n. sp.

Terrestrial, a low tufted plant about 2 feet tall, with fairly stout stems. Leaves broad lanceolate acuminate cuspidate glabrous, six inches long by three broad, ligule oblong rounded at the tip one inch long and  $\frac{1}{2}$  an inch broad, spike rather lax nodding six inches long. Bracts oblong truncate quite obtuse about 20 on a spike, one and a half inch long, and half an inch wide. Flowers in pairs in the bracts. Calyx slender cylindrical  $1\frac{1}{2}$  inch long. Corolla tube twice as long, lobes linear narrow. Staminodes broader linear  $1\frac{1}{4}$  inch long. Lip cuneate bilobed, lobes divaricate tapering shorter than the staminodes, all white. Stamen very slender red, twice as long as the lip. Anther very small reniform with the basal points incurved.

Kedah Peak at an altitude at 4,000 feet.

This plant has somewhat the habit of *H. spicatum* Ham. but the stamen is very much longer than the lip.

*H. coronarium* Koenig, mentioned as occurring in Malacca in the Flora of British India is only so far as I have seen cultivated in the Malay peninsula.

CAMPTANDRA n. gen.

Herbaceous glabrous plants with a very small rhizome, stems erect one or few, leaves few ovate petiolate. Flowers several enclosed in a terminal green spathe, showy fugacious white or violet shortly pedicelled. Calyx tubular three-lobed, lobes equal. Corolla tube slender long, lobes lanceolate or oblong. Lip obovate bilobed. Staminodes large obovate petaloid.

Stamen projecting beyond the tube. Anther long slender curved dorsifixed versatile, the base prolonged into two parallel processes, the upper part only polliniferous. Style slender, stigma capitate. Capsule oblong, seeds numerous small curved fusiform aril laciniate. Two species occurring only on hills in the Peninsula and in Borneo. These plants have been referred to the genus *Kæmpferia*, but though allied they are very distinct in the peculiar arrangement of the anther quite unique in the order. As in *Kæmpferia* the lip and staminodes are the showy part of the flower, being broad and petal like. On the lip at the base are two keels with a groove between leading to the tube which contains the honey. The anther is curved and narrow and fixed by the back on the filament so that it swings readily, and the lower part is prolonged into a pair of long spurs. When a bee visits the flower it follows up the groove of the lip to insert its proboscis into the tube, and as its head touches the processes of the anther and pushes them back it brings down the upper part of the anther (where alone is any pollen,) and the stigma upon its back. Of course on visiting another flower the same thing occurs, and the pollen of the first flower is brushed off by the stigma of the second and so the flower is fertilized. Unlike *Kæmpferia* the Camptandras often set fruit, although the flower is open only for a few hours in the morning. This is doubtless due to the more certain working of this neat though simple mechanism.

*C. parvula* n. sp. *Kæmpferia parvula* Bak. l.c. p. 233.

A small herb about six inches tall. Stems several covered with sheaths below, leaves 4 or 5 ovate acuminate oblique, and unequal sided dark green, base broad, 2 to 3 inches long one inch wide, petiole slender an inch long. Spathe ovate acute an inch long. Flowers small, 1 inch across. Calyx  $\frac{1}{4}$  inch long tubular green, lobes very short. Corolla tube half an inch long white, lobes oblong truncate mucronate. Lip orbicular bilobed crenulate white, with an ocre patch on the ridges and some pink marks in the mouth. Staminodes subspathulate broad crenulate  $\frac{1}{2}$  an inch long white. Anther curved crescent-shaped, moveable. Stigma subtriangular. Capsule oblong thin  $\frac{1}{2}$  an inch long, seeds numerous small fusiform

curved, dotted black with an aril of whitish linear processes. Common on rocks and banks at 2000—4000 feet.

Selangor; Bukit Kutu. Pahang, Tahan river. Penang, Government Hill. Perak. Thaiping Hills, Bujong Malacca, Goping (King 823). Tomoh (Machado).

*Var. angustifolia.*

Leaves lanceolate acuminate, 3 inches long by  $\frac{1}{2}$  to one inch base narrowed into the petiole, petioles longer and more slender.

Borneo, Sarawak, near Matang (Haviland, em. m. i.)

*C. lalifolia.* n.sp.

Stem two feet tall or less, succulent. Leaves 1 to 4, coriaceous acuminate 5 inches long and 2 inches wide dark smooth, petiole one inch purple. Spathe ovate green an inch and half long. Flowers several white or violet showy. Calyx tubular three-lobed spotted red. Corolla tube  $1\frac{1}{2}$  inch long white, lobes lanceolate obtuse white. Lip orbicular bilobed  $1\frac{1}{2}$  inch across white or violet, the ridges at the base yellow. Staminodes oblong obovate rounded white or violet. Anther long narrow curved, base bifid translucent. Capsule oblong fawn-coloured  $\frac{1}{2}$  inch long; seeds numerous.

Perak. Bujong Malacca; 3000-4000 feet alt, fl. Sept. on rocks or the ground. Without locality (Dr. King, No. 7219.) This is a very much larger and succulent plant. It has a very short rhizome and the stems are usually solitary, somewhat thickened at the base. The flowers are large and vary from pure white to violet. They last only a few hours. The seed often germinates in the spathe.

#### KÆMPFERIA.

Hardly any species of this genus have yet been found wild within our boundaries, though some kinds occur in the Lankawi islands and in Southern Siam. A few however are cultivated as spices by the Chinese and occasionally turn up in waste ground.

The genus if confined to the original *K. rotunda* L and its allies is a fairly distinct one, but unfortunately, *Gastrochilus pandurata* was described by Roxburgh as a *Kæmpferia* and

later botanists added more of this very distinct genus, so that it was absolutely proposed to amalgamate the two. The genus *Kaempferia* may be thus defined. Herbs with an underground rhizome often tuberous and aromatic, stem short or produced, rarely absent. Leaves thin in texture few or several. Inflorescence spicate subterminal with thin lanceolate bracts. Flowers showy thin textured and very fugacious, opening singly violet or white. Calyx short cylindric. Corolla-tube long slender lobes narrow linear inconspicuous. Staminodes very large rounded horizontal clawed, forming with the rounded bilobed lip a nearly circular flower. Stamen short thin flat with a long narrow petaloid crest. Anther thin and usually concealed in the tube, linear not versatile and dorsifixed. Style slender. Capsule (rarely produced) oblong thin walled.

Distribution: India, Burmah, Siam and Cochin China.

The thin flat staminodes usually of the same color as the lip and lying in the same plane form the conspicuous part of the flower, the petals being much smaller and usually reflexed, hidden behind the staminodes and lip. The entrance to the nectary is very small and is partly blocked by the crest of the anther.

The genus can readily be divided into sections, *viz.* 1. *Sincoroides* (Horan) stem very short, flowers appearing with the leaves. This includes *K. Galanga* L sometimes cultivated here by the Chinese; *K. marginata* Carey. *K. speciosa* Bak. *K. Roscooeana* Wall; natives of Burmah. *K. elegans* Wall. Siam (Curtis.) and Burmah. *K. angustifolia* Roxb. Bengal, also Siam (Dr. Keith.) *K. ovalifolia* Burmah and Siam, also collected in Malacca by Col. Farquhar according to Baker, but doubtless cultivated there. *K. pulchra* Ridl. Lankawi and Siam. *K. glauca* Ridl. Siam. *K. undulata* Teysm, locality unknown.

Sect 2. *Protanthium*. Leaves and flowers appearing at different times, including only *K. rotunda* L "Kunchur" of the Malays only cultivated here, and *K. candida* Wall. of Burmah.

Sect. 3. *Monolophus*; with an erect rarely prostrate leafy stem. *K. linearis* Wall, *K. secunda* Wall. *K. sikkimensis* King of India. *K. macrochlamys* Baker of Burmah and *K. decus-sylvae* Hallier of Borneo, a peculiar prostrate form.

Sect. 4. *Stachyanthes* with a leafy stem and flowers in a long spike. *K. scaposa* Benth. India.

Excluded from the genus are *K. pandurata* Roxb., *K. Prainiana* King, *K. concinna* Bak., *K. parviflora* Wall., *K. anomala* Hallier, all of which belong to the genus *Gastrochilus* as probably do *K. involucrata* King, *K. Andersoni*, and *K. siphonantha* Bak. from India and Burmah, and *K. purpurea* Koen. (Ketz observ. iii. 57) Junk Ceylon. *K. parvula* King is *Camptandra parvula* Ridl.

*K. pulchra* n. sp.

Leaves two ovate blunt spreading out usually flat on the ground, blade seven inches long by five inches across, petiole short, three inches long, dark olivaceous black with grey markings above. Inflorescence between the leaves, peduncle three inches long green terete, spike sub-cylindric one inch long covered with persistent convolute bracts, the outer one brown and ribbed the inner ones about 20, thin white, lanceolate. Flowers numerous produced singly at considerable intervals of time, thin fugacious. Calyx very thin tubular. Corolla tube about an inch long very slender white, lobes linear obtuse white reflexed  $\frac{1}{2}$  an inch long. Staminodes and lip connate below. Staminodes obovate as long as the lip obtuse, mauve. Lip deeply bilobed, lobes oblong apices rounded  $\frac{1}{2}$  an inch long, mauve with the base pale yellowish white. Stamen, filament very short. Anther narrow oblong, crest very long linear apex entire rounded recurved. Style much shorter than the appendage and projecting but little beyond the anther, stigma two lipped, lower lip prolonged.

Siam. Bangtaphan very common in dry places. (Dr. Keith). Lankawi (Curtis). This pretty plant which has long been cultivated in Singapore is nearly allied to *K. Roscoiana* Wall, but differs in the mauve not white flower, and the remarkably long entire anther appendage which is longer than the rest of the stamen. The anther and style are hidden in the tube, being much shorter.

*K. glauca* n. sp.

Leaves 3 unequal orbicular cuspidate, the largest five inches long by three wide, glaucous green. Flowers numerous in a spike almost hidden between the leaves. Bracts lanceo-

late acuminate about an inch long, narrow, spotted with red. Calyx one inch long tubular spathaceous entire spotted red, Corolla tube cylindric two inches long,  $\frac{1}{8}$  inch thick pale violet, lobes lanceolate cuspidate  $\frac{1}{2}$  an inch long  $\frac{3}{16}$  inch wide, white spotted with red at the tip. Lip orbicular cleft nearly to base, inner edges straight violet with a white spot at the base, one inch across. Staminodes orbicular narrowed at the base  $\frac{1}{2}$  an inch long and wide, violet. Stamen, with the anther entirely outside the tube nearly  $\frac{1}{4}$  inch long, cells parallel rather fleshy pollen white, crest large reniform recurved broad entire violet. Style longer than the anther purple, stigma capitate deep red purple. Siam, Kasum, (Curtis).

This curious and pretty plant grows abundantly on the limestone rocks of Kasum, the rhizomes being imbedded so deeply in chinks of the rock that it is necessary to break away the rock to get at them. The gray green leaves and violet flowers make it an attractive plant. Structurally its most remarkable point is that the anther projects outside the tube entirely, instead of being concealed within as in the case of *K. elegans*, etc, and the style is also visible from the outside.

#### GASTROCHILUS.

This genus was first distinguished by Wallich who described two species from *Kæmpferia* as it then stood by the lip being saccate or basin shaped, and by the habit. This form of the lip is peculiar to a few species only of the plants which I would refer to the genus, and which as I have already said is very distinct from the true *Kæmpferia*. The genus may be thus defined. Small herbs with a short rhizome. Stem tall and leafy or short. Leaves usually several together lanceolate or ovate. Inflorescence spicate with large bracts sometimes colored springing from the axils of the leaves, or independently on the rhizome or terminal when the stem is tall. Flowers thin white, yellow or red. Calyx tubular. Corolla tube rather long slender lobe oblong or lanceolate. Staminodes similar but slightly longer erect. Lip oblong or obtuse entire or three lobed. Stamen thick and fleshy with an oblong anther, the crest of which is small rounded or lobed.

Distribution : India, the Malay peninsula and islands.

The species can be divided into three groups. *Acranthis*, in which the flower spike is borne on the top of a leafy stem; *Mesanthi* from the centre of a leaf tuft; and *Exanthi* outside the leaf-tuft. The last group suggests a close affinity with the Curcumas, of the section Hitcheniopsis, the real difference being the shape of the bracts and their more cone-shaped arrangement. Indeed *C. Kunstleri* might almost as well be put in *Gastrochilus* as in *Curcuma*. *Scaphochlamys* described by Baker and referred to the neighbourhood of *Elettariopsis*, is truly a *Gastrochilus*, though in some respects a curious form.

The *Gastrochili* inhabit woods, and though the species are usually local, that is to say restricted in area, they usually occur in quantity when met with. The flowers, which are very delicate and pretty, often sweet scented, open one at a time about midday, withering towards evening. They very rarely produce fruit. Many species are well worth cultivating, and grow readily in pots, or in shady spots in the ground.

As the genus has been so much confused with *Kæmpferia* I submit a list of all species known to me with localities.

#### § *Acranthis*.

*G. pulcherrima* Wall. India and Siam,

*G. rubrolutea* Bak. India.

*G. ochroleuca* Ridl. Siam.

*G. albosanguinea* Ridl. Perak.

#### § *Exanthi*.

*G. Prainiana* (Bak). Perak.

*G. tillandsioides* Bak ? Perak.

*G. concinna* Bak. (sub *Kæmpferia*) Perak.

*G. calophylla* Ridl. Selangor.

*G. oculata* Ridl. Selangor.

*G. biloba* Ridl. Pahang.

*G. Hallieri* Ridl. \**Kæmpferia anomala* Hallier Bulletin Herb. Boissier. VI. p. 357 pl. 10.

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\* There being nothing anomalous in this plant, I have taken the liberty of altering its specific name as well as its generic one.

§ *Mesanthi*.

- G. longiflora* Wall. India.
- G. minor* Bak. Perak.
- G. scaphochlamys* Ridl. Malacca.
- G. lancifolius* Ridl. Johor.
- G. longipes* King. Perak.
- G. Curtisi* Lankawi.
- G. clivalis* Ridl. Selangor.
- G. angustifolia* Hallier. Deli, Sumatra.
- G. pandurata* Ridl. India.
- G. parviflora* (Wall.) (sub *Kämpferia*) Burmah.
- G. involucrata* (Wall.) India.
- G. Andersoni* (Bak) Burmah.
- G. parvula* Wall. India

*G. ochroleuca* n. sp.

Stem over a foot tall. Leaves distant lanceolate acuminate base broad inequilateral 5 inches long over one inch wide, petiole one inch, sheaths  $1\frac{1}{2}$  to 2 inches long, ligule short rounded, spike terminal short, shorter than the upper leaves. Bracts lanceolate acute deep green. Flowers nodding. Calyx cylindric, as long as the blunt bracteole. Corolla tube twice as long cylindric, lobes oblong lanceolate blunt  $\frac{1}{4}$  inch long. Staminodes broader much shorter than the lip white. Lip obovate nearly flat  $\frac{3}{4}$  inch long by half an inch wide submucronate, yellowish white with an orange spot on the central bar. Stamen shorter than corolla-lobes, fairly stout cylindric, anther linear crest short, style thick decurved stigma large.

Siam. Between Kasum and Pungah. Flowered in Penang gardens Nov. 1896. (Curtis).

*K. pulcherrima* Wall. Pl. Asiat. Rar. 122 t 24. A native of Burmah and Siam is recorded from Penang (Maingay) in the Flora of British India. This must surely be a mistake.

*G. longiflora* Wall. l.c. 25, is also recorded from Malacca

without collector's name. I have seen no specimen.

*G. albo-sanguinea* n.sp.

Plant 12-18 inches tall, stem leafy. Leaves about six oblong lanceolate acuminate bases broad rounded, blade eight inches long, by  $2\frac{1}{2}$  across, glabrous, petiole rather slender two inches long, sheaths about six inches. Spike central shorter than the upper leaves about five inches long. Bracts lanceolate acute closely appressed. Calyx spathaceous  $\frac{1}{4}$  inch long truncate. Corolla tube one inch long, hardly longer than the bracts, lobes linear incurved white. Staminodes porrect, and curved up overlying the upper edges of the lip, oblong obtuse, white with a pink tinge. Lip saccate white with an everted red margin about  $\frac{3}{4}$  inch long. Stamen slender, filament fairly broad flattened. Anther linear half an inch long, crest none.

Perak, on Maxwell's Hill, collected by Mr. F. A. Wooldridge and flowered in the Botanic Gardens, Penang, September 1894.

This pretty plant is distinguished by the lip being narrowed at the base with the sides turned up and the edges turned out and down. The staminodes lying along the upper edge of the lip enclose it so that a bee or other insect must creep in so as to get at the honey.

The plant is very closely allied to *G. pulcherrima* Wall, differing in the more convolute lip and longer petioled leaves. An exceedingly similar if not identical plant occurs also in Lankawi (Curtis 2677).

*G. minor* Bak. Fl. Brit. Ind. l.c. 217.

Rhizome very short, leaves about 4 in a tuft oblanceolate obtuse about 4 inches long,  $1\frac{1}{4}$  across, dark green with a central silvery bar, petiole about an inch long, sheaths red. Spike short from the centre of the leaves. Bracts yellowish. Flowers large and showy. Calyx tubular. Corolla tube not longer than the bract, lobes oblong obtuse yellow. Staminodes oblong obtuse yellow with red spots at the base. Lip an inch long  $\frac{1}{2}$  an inch across, flat, oblong obtuse with a central keel running the whole length and bifurcating at the apex yellow darkest towards the apex with crimson spots at the base. Stamen long pink, filament

linear thick arched, anther somewhat broader cells divaricate at apex, crest rounded obscurely three lobed, rather small. Style slender shorter than stamen. Stigma cuneate, stigmatic surface terminal.

Perak. Batang Padang (Curtis); Bujong Malacca abundant; Larut (King's collector).

A very pretty plant with its dark green and silver barred foliage. The name given to it is not very suitable as it is larger than a good many species, and has the largest flowers of any. The flat lip and arched stamen are peculiar points in it.

*G. Scaphochlamys* n. sp. *Scaphochlamys Malaccana* Bak. Fl. Brit. Ind. p 252. Rhizome creeping long with stout roots. Leaves in tufts of two or three, with a few sheathing at the base lanceolate inequilateral acute or blunt, dark green, six or seven inches long  $1\frac{1}{2}$  inch broad, pubescent, especially along the midrib, petiole 3-4 inches long pubescent. Scape central 5 to 9 inches long, pubescent. Bracts spiral lingulate blunt green with red sheaths, pubescent one inch long  $\frac{1}{2}$  inch wide. Flowers white, with a yellow bar on the lip, sweet-scented.

Corolla tube slender one inch long, lobes oblong lanceolate  $\frac{1}{2}$  inch long. Staminodes as long and similar. Lip obovate undulate bilobed. Stamen broad white, anther cells narrow, crest very large and orbicular. Style shorter than the crest.

Malacca. Woods on Mount Ophir, (3141); Bukit Muar (Feilding).

The chief peculiarity of this plant is the curious spirally arranged bracts which gradually spread out as the spike develops. The rhizome too is more widely creeping than is usual, otherwise the plant is quite normal.

*G. lancifolius* n.sp.

Rhizome rather slender. Leaves in pairs lanceolate acuminate acute inequilateral, blade 7 or 8 inches long by 2 inches wide glabrous, petioles five inches long, sheathing for about half their length. Spike central 3 inches long zigzag with 5 or 6 green oblong cuspidate distant bracts  $\frac{1}{2}$  to one inch long. Flowers rather small yellow, three in a bract. Calyx short tubular  $\frac{3}{4}$  inch. Corolla tube long and slender one inch long, lobes linear  $\frac{1}{4}$  inch. Lip half an inch long bilobed, lobes rounded. Staminodes ob-

long rounded nearly as long as the corolla lobes but broader. Anther with linear parallel-cells, crest large broader than the anther broadly cuneate shortly three-lobed.

Johore. Kwalia Sembrong (Lake and Kelsall 1892).

This is most nearly allied to *G. scaphochlamys* Ridl. but has smaller bracts, and flowers with longer corolla tubes, and a different crest.

*G. longipes* King and Prain mss.

Rhizome rather far-creeping. Leaves two, blade elliptic ovate eight inches long by four wide subacute glabrous, petiole 9 inches long, 3 inches sheathing. Spike central 2 inches long. Bracts narrow lanceolate few and long. Corolla tube long and slender, lobes lanceolate half as long as the lip. Lip entire oblong apex rounded edges crisped and thickened central bar much thickened  $\frac{1}{4}$  inch long. Staminodes broader than corolla lobes, and longer than the lip. Stamen, filament rather slender, anther oblong, crest rather large oblong rounded. Style considerably longer. Stigma broadly obconic.

Perak. Briah, Larut (Wray 4220).

This resembles *G. lancifolius* in the form of the spike and the flower especially in the entire-crisped lip. The foliage however is very distinct at two leaves being very large and broad with very long petioles. The long decurved style projecting some way beyond the anther is unusual but is matched in *G. Curtisi*.

*G. Curtisi* Baker. Bot. Mag. t. 7363.

Leaves four in a tuft, blade ovate oblong acute, 5 inches to a foot long, two to six inches across, bright green pubescent on the back, petiole stout six inches long, sheaths broad about 2 inches long purplish. Spike central shorter than the petioles about an inch long. Bracts oblong, white, as long as the calyx. Calyx tube white cylindrical, lobes lanceolate acute pubescent, one inch long. Corolla tube two inches long cylindric dilated a little at the top, lobes oblong lanceolate one inch long. Staminodes a little shorter, all white. Lip longer oblong obtuse flat, yellowish cream with red marks on the sides. Stamen, filament cylindrical pubescent, anther short and thick, crest short broad

truncate. Style considerably longer thick above the anther, stigma cup-shaped.

Lankawi Islands on limestone rocks, (Curtis 2896).

The most peculiar point about this plant is that the anther cells apparently open at the top only and do not split for their whole length as is usual. There is a large depression behind the anther formed by the broad and short crest from which the long style protrudes. The back of the leaves are pubescent, and in the picture the upper surface is represented so also, but I do not see any hairs here in the specimen, nor are they mentioned in the description.

*G. clivialis* n. sp.

Rhizome rather slender with long roots. Leaves 3 or 4 in a tuft, ovate to lanceolate acute narrowed at the base into the petiole inequilateral  $4\frac{1}{2}$  to 8 inches long and 2 inches wide, petiole 5 or 6 inches long sheathing for about 3 inches, all glabrous except about the midrib on the back which bears scattered hairs. Spike central 3 inches long, enclosed in the sheaths. Bracts long and narrow containing four or five flowers each with two long narrow linear acute transparent bracteoles one inch long and  $\frac{1}{8}$  inch wide. Calyx tube very narrow half an inch long, with three lanceolate lobes, two longer than the third. Corolla tube slender dilated a little upwards 2 inches long, lobes linear  $\frac{1}{2}$  an inch long by  $\frac{1}{8}$  inch wide. Lip oblong entire apex rounded, crisped, median bar thickened. Staminodes of the length of the corolla lobes but broader and blunt. Stamen filament rather slender, anther oblong thick with an oval crest longer than the club shaped stigma.

Selangor, Pahang Track, 15th Mile, on banks.

*G. pandurata*. Ridl. *Kempferia pandurata*. Roxb. Asiat. Res. XI. 320 t. 2.

The "Temu Kinchi" of the Malays is sometimes cultivated here, the rather stout rhizome which is yellow inside and very aromatic being used in medicine. It is probably a native of India. The leaves are about 5 in a tuft oblong ovate with a broad base and long petiole. The spike is short and central. The flowers are white or pink, lip saccate white with pink spots.

*G. Prainiana* n. sp. *Kæmpferia Prainiana* Bak. l.c. 220.

Leaves lanceolate acute 8 inches long  $1\frac{1}{2}$  wide, pubescent on the back with a petiole of equal length and a long slender spike of many imbricate bracts, rising directly from the rhizome about 9 inches tall. Flowers red and white. Corolla tube an inch long, lobes  $\frac{1}{2}$  an inch oblong ascending, lip oblong cuneate much longer.

Perak, Goping, (King's collector, No. 226.)

My specimen has no flower, but the plant is very distinct in its long sessile cylindric spike. It should be sought again in the Kinta valley.

*G. tillandsioides*. Bak. l.c. based on a drawing made by Kunstler from a plant probably collected in Perak, I have not seen, and as far as description goes I see but little difference between it and the preceding.

A very curious plant I found at the base of Gunong Panti in Johore, has unusually large leaves ovate glabrous 9 inches long and 6 across, petiole 7 inches and one or more cylindric imbricated spikes in the centre, 6 inches long, the bracts  $1\frac{1}{2}$  inch long. I could find no trace of flowers, but imagine it belongs to this genus and if so is by far the largest species.

*G. calophylla* n. sp.

Rhizome short rather slender. Leaf solitary obovate rounded rather thick six inches long and four across, deep bluish green above with a white feather on each side, rosy pink beneath, petiole two inches long or more channelled rather stout. Inflorescence close to the leaf and enclosed with the petiole in a red sheath, about as long as the petiole. Bracts narrow lanceolate red, blunt with a minute point,  $\frac{3}{4}$  inch long rolled round the base of the flower, two to each spike. Spikes six in the inflorescence, on a peduncle an inch long. Calyx tubular very short. Corolla tube one inch long lobes lanceolatx acute  $\frac{3}{4}$  inch long. Staminodes much shorter oblong obtuse rounded. Lip obovate bifid at the apex. All white except for a stain of pale yellow in the centre of the lip. Stamen short, anther oblong pubescent, crest broader than the anther rounded retuse. Stigma cup-shaped.

Selangor. In thick woods on the Pahang track. Flowered in May.

This is a very pretty foliage plant and one well worthy of cultivation. The deep blue green leaves with the white band on each side and deep rose pink backs make it very attractive.

*G. concinna* n.sp. *Kœmpferia concinna*. Baker. Fl. Brit. Ind. l.c. 221.

Rhizome slender. Leaf solitary, petiole very long and slender 9 inches tall, blade lanceolate acuminate with a broad cordate base six inches long, one and a half broad glabrous. Scape three inches long, peduncle one inch long enclosed with the base of the petiole in two sheaths, one longer than the scape. Bracts lanceolate acute rather thin glabrous red one inch long. Calyx very short. Corolla tube slender longer than the bracts, gradually dilated to the throat, lobes white with dark red stripes. Lip oblong margins incurved. Anther crest small entire.

Perak. Ulu Bubong. (Dr. King's collector 10135).

I have only seen dried specimens of this, and those in not very good condition. Its most striking point is the remarkable length of the slender petiole and the cordate base of the leaf.

*G. biloba* Ridl. Trans. Linn. Soc. Vol 3. 379.

Rhizome long slender. Leaf solitary, petiole six inches long pubescent, blade lanceolate to elliptic oblong obtuse 6 to 8 inches long, 3 to  $3\frac{1}{2}$  broad, base rounded, dark green with silvery bands above, purplish beneath, midrib pubescent. Scape lateral base of peduncle enclosed with base of petiole in a long narrow sheath 4 inches long. Peduncle 2 inches or less. Spike one inch long. Bracts lanceolate acute dark red. Bracteoles 2 lanceolate thin. Calyx  $\frac{1}{2}$  an inch long tubular dilated upwards, pale with red transverse bars and short obtuse lobes. Corolla tube  $1\frac{1}{4}$  inch long slender white, lobes lanceolate acute reflexed  $\frac{3}{4}$  inch long  $\frac{1}{4}$  inch wide white. Lip oblong bilobed, lobes rounded obtuse nearly an inch long  $\frac{3}{4}$  inch wide white tinted with pink. Staminodes more oblong  $\frac{1}{2}$  an inch in length obtuse white, anther oblong wide, cells narrow linear, crest rather large rounded ovate sulcate.

Pahang at Kwala Tenok ; Tahan river. July 1891.

*G. oculata* n.sp.

Rhizome rather long creeping. Leaf solitary ovate glabrous 8 inches long by  $4\frac{1}{2}$  wide, dark green, purplish beneath, prominent nerves about 14, petiole 10 inches long or less. Scape short lateral, peduncle 1 inch long enclosed in the sheath with the base of the petiole. Spike  $1\frac{1}{2}$  inch long. Bracts ovate to lanceolate  $\frac{1}{2}$  an inch long red, lower ones blunt, upper ones acute. Flowers 2 in a bract. Calyx  $\frac{1}{2}$  inch long, lobes 2 very short. Corolla tube an inch long slightly dilated upwards, lobes lanceolate acute  $\frac{3}{4}$  inch long. Staminodes oblong lanceolate obtuse broader, pubescent  $\frac{1}{2}$  inch long white. Lip obovate bilobed  $\frac{1}{2}$  an inch long and as wide white, centre yellow and 2 deep crimson patches at the base. Stamen filament short and broad, anther thick, cells divaricating with a deep groove between, pubescent, crest very short rounded.

Selangor, Pahang track on banks at about 1500 feet altitude.

CURCUMA.

The Turmerics are not very strongly represented in the Malay Peninsula. The head quarters of the genus lying further north in Northern India and Burmah. Very few occur in the Malay islands and of those that do it may be doubted whether most of them are not aliens. The genus is closely allied to *Gastrochilus* chiefly differing in the cone-like flower spike with very broad bracts, the upper ones often differently colored from the lower ones, and as long or longer than the flowers. The rhizome is usually stout and strongly aromatic and bears tubers either sessile or on long stalks, but in the species which frequent our damp and shady jungles it is more slender, and often produces no tubers. Indeed these fleshy tuberous rhizomes appear to be adapted for food stores during the dry seasons, and thus as there are no dry periods in the Malay jungles they are unnecessary. The leaves are borne in tufts on the rhizome and are from two to six or more in a tuft, usually oblong, or oblong ovate with long petioles. The flower spikes are in all our native species produced in the centre of the leaf-

tuft, and thus belong to the section *Mesantha* of Horaninow. One species of the section *Exantha* with the spike outside the tuft (*C. Zedoaria*) is commonly to be met with round villages, where it is cultivated. The flower spikes are borne on stout stalks and are shorter than the leaves. They have large and broad membranous bracts closely set, in the axils of which are two or more thin textured fugacious flowers, which project usually but little beyond the bract. The flowers open, one or two at a time upon the spike. The calyx is very short cylindrical and toothed. The corolla tube is usually slender enlarged upwards, the petals oblong or ovate oblong, the staminodes very similar and connate with the stamen. The lip broad rounded entire or more or less lobed. The anther, usually large, has in some species a small round crest, in others there is none. In many species it is spurred with curved processes, the use of which has been explained and illustrated by Forbes. (Wanderings of a Naturalist, p. 248) where he shows that they act as levers to rotate the anther upon the back of a bee when entering the flower in search of honey so as to deposit the pollen on its back. In these species the anther is moveable upon its filament, but in the other species there is nothing of this arrangement and the anther is not moveable. The fruit which is very rarely produced is a globose capsule with numerous seeds.

Several species are cultivated by the Malays, but except *C. longa* L. the turmeric, and *C. Zedoaria*, the Zedoary, only in small quantities, and as several kinds known by Malay names never seem to produce flowers, it is impossible at present to identify them. Of these Temu hitam, rather a small kind, has the rhizome light blue inside, and a taste of Turkey rhubarb, but somewhat bitter and slightly hot. The leaves are rather flaccid dark green and glaucous.

Temu lati, or Temu badoh, is a very much larger kind with deep green leaves the blade over two feet long and five inches wide with an obscure brownish mark in the upper part of the midrib, and the petiole winged, six inches long and half an inch through. The rhizome is very light blue inside and has a musky taste.

Temu pauh has a yellow rhizome with a smell and taste of wild carrots.

*C. Zedoaria* Roscoe, Scitamineæ. t. 109. *Curcuma zerumbet* Roxb.  
As. Res. XI. 333. *C. Sumatrana* Miq. Fl. Sumatra. p. 615.

Rhizome large with oblong rounded tubers, orange colored inside. Leaves in pairs  $1\frac{1}{2}$  foot long and six inches across lanceolate cuspidate glabrous bright green with a central purple brown bar. Scape outside the tuft of leaves, peduncle  $1\frac{1}{2}$  foot long,  $\frac{1}{4}$  inch through covered at the base by a sheath six inches long, green with an obtuse apex, and cleft to the base. Spike six inches long or more, with about twenty bracts, the lower ones green more or less tipped with pink, the terminal ones lanceolate deep crimson thinner in texture; the lower ones two inches long and  $1\frac{1}{2}$  inch wide rather soft quite blunt and rounded. The flowers are four to each bract. Bracteoles thin transparent white hardly an inch long lanceolate. Calyx thin transparent with a ring of erect hairs at the base,  $\frac{1}{4}$  inch long, bifid slightly hairy all over, apices rounded. Corolla tube an inch long funnel-shaped yellowish white, the lobes half an inch long pure white, thin,  $\frac{3}{8}$  inch across, the upper one mucronate. Lip obovate oblong over one inch long dilated towards the apex, which is bifid, pale yellowish with a thicker central bar; the apex orange with a faint purple line along each side of the bar. Staminodes oblong larger and stiffer than the petals obtuse erect. Stamen filament for the greater part adnate to the staminodes, ovate white, the anther mobile oblong squared pubescent, the basal processes horn-like acute; pollen white. Ovary nearly  $\frac{1}{4}$  inch in length hairy. Style projecting beyond the stamen. Stigma transversely oblong.

The Zedoary is known to the Malays as Temu Lawas. It is frequently cultivated and often persists in waste land after cultivation is abandoned and seems to establish itself thoroughly. It frequently grows among lalang and generally flowers there, but it is not easy to flower it in a pot or in really good soil. It is a very handsome plant when in flower, and its foliage is also ornamental. It is said to be wild in the Eastern Himalayas and is cultivated all over the East.

Singapore, common. Penang, roadside near Balik Pulau. Kedah, Yan : Siam at Bangtaphan (Dr. Keith). Also Celebes at Minahassa (Koorders 19671.5)

*C. longa* L. Turmeric, "Kunyet," is often cultivated by Chinese, but I have never seen it establish itself anywhere as Zedoary does. It is a much smaller plant with light green leaves, and a short spike with pale green bracts at the base and pink ones at the top. The flowers are yellow.

*C. grandiflora* Wall. Baker Fl. Brit. Ind. l.c. 216. Malay Peninsula, Wallich. I have never seen anything like here. There is some doubt as to where the plant came from, but it was probably not collected in the peninsula.

*C. (Hitcheniopsis) Kunstleri* Bak. l.c. 214.

Rhizome horizontal rather stout. Leaves in pairs obovate cuspidate 12 inches long and six inches across above deep green shining ribbed, the back purple pubescent, keel thick channelled four inches long. Spike from between the leaves about four inches long broad shortly peduncled. Bracts few about an inch broad with rounded apices deep red; inner bracts shorter oblong ovate cartilaginous deep red. Flowers rather large protruded from the bracts. Calyx nearly half an inch long cylindric deeply split apex obscurely trifid red. Corolla tube an inch long enlarged upwards white; lobes lanceolate acute  $\frac{1}{2}$  an inch long white. Staminodes oblong obtuse striate white pubescent. Lip obovate obtuse denticulate apex bilobed, base channelled, edges of channel elevated, yellow darker in the centre and at the base with a few pink streaks. Stamen pubescent with a broad filament, anther oblong  $\frac{1}{4}$  inch long emarginate. Stigma small rounded and beaked. This plant grows in dense damp jungles often in great masses. The leaves are usually purple on the back, but sometimes all green. It is very easy to grow and flowers readily. The structure of the flower is quite that of a *Gastrophilus*, from which genus it really chiefly differs in the large broad bracts like those of other *Cucumas*.

Perak. Thaiping Hills (Curtis, Wray No. 3702, 3662, 3388) Tapa (Wray 193) Dindings on Gunong Tungul.

*Var. rubra.* Staminodes and lip and anther dark yellowish red.

Perak. Kwala Dipang, at the base of the limestone cliffs.

*C. sylvestris* Ridl. Trans. Linn. Soc. vol. 3 p. 378.

Rhizome slender creeping for some distance. Leaf solitary with a slender petiole  $1\frac{1}{2}$  feet long, blade ovate acute eight inches long four and a half inches wide, green above purple beneath, glabrous. Scape slender four to six inches long close to the leaf and enclosed with the petiole at the base by a large sheath; spike obconic  $1\frac{1}{2}$  inch long. Bracts broad ovate with the points recurved rosy. Flowers small white. Corolla with a slender tube  $\frac{1}{2}$  an inch long, lobes narrow linear acute  $\frac{1}{2}$  an inch long. Lip oblong obovate emarginate, the lobes rounded white with a yellow central spot, and some violet streaks on the lobes. Staminodes broader than the petals lorate obtuse white. Stamen with a broad filament, anther oblong with the crest broad recurved obtuse dark violet, cells narrow linear.

Pahang, Tahan Woods.

*C. parviflora* Wall. Fl. As. Rar. 147. t 57. collected by Wallich near Prome in Burmah has been found by Dr. Keith in Siam.

#### CONAMOMUM n. gen.

Stout plants with a woody rhizome elevated above the ground. Leafy stems tall. Leaves oblong lanceolate. Scapes on the rhizome peduncled with dense spikes of flowers, bracts stiff green or brown persistent. Calyx tubular with three equal regular lobes. Corolla tube short and thick, lobes unequal, the upper one largest oblong. Lip three-lobed or entire. Staminodes linear smaller than corolla lobes. Stamen short and broad, anther with curved linear arms above. Capsule subglobose or oblong.

These plants have the general habit of *Geostachys*, but possess free staminodes of some size, and the curved arms of the anther like those of *Amomum*.

*C. citrinum.* n. sp.

Leaves oblong lanceolate cuspidate, base acute a foot or more long, 3 inches wide, glabrous, midrib stout, petiole short winged, ligule  $\frac{1}{4}$  inch long. Scapes several about 13 inches tall. Peduncle 8 inches long and nearly  $\frac{1}{4}$  inch through, stiff with

numerous oblong truncate green sheathing leaves 2 inches long split almost to the base; spikes very dense many flowered. Bracts light green stiff ovate acute  $\frac{1}{2}$  inch long. Bracteole broadly ovate nearly encircling the flower. Calyx shortly tubular thinly cartilaginous, with three equal lobes,  $\frac{1}{4}$  inch long  $\frac{3}{8}$  inch wide. Corolla tube short and thick, lobes elliptic oblong obtuse translucent white, upper one  $\frac{1}{2}$  an inch long and  $\frac{3}{5}$  inch wide, the lower ones shorter. Staminodes short linear from a broad base blunt pale red. Lip three lobed, lateral lobes erect rounded midlobe oblong obtuse rounded  $\frac{1}{4}$  inch across, centre depressed thickened bright yellow with pale red stripes on the side lobes. Stamen  $\frac{1}{2}$  an inch long, filament linear, anther dilate, with two curved linear arms  $\frac{1}{8}$  inch long. All yellow spotted with red. Stigma clubbed with a narrow transverse slit. Capsule globose  $\frac{1}{2}$  an inch long dark purple, seeds numerous.

Perak. Maxwell's Hill (No. 2959), Bujong Malacca (9788.)

*C. utriculosum* n. sp.

Rhizome very large elevated considerably above the ground on stout roots, thick. Stems about six feet tall clubbed at the base. Leaves lanceolate or oblong lanceolate cuspidate narrowed at the base, 16 to 18 inches long 2 to 4 inches wide, glabrous, petiole one inch long or less channelled, ligule oblong obtuse glabrous. Spike terrestrial on a stout peduncle six inches tall covered with loose stiff truncate leaves an inch and a half long, above densely floriferous, inflorescence 6 to 18 inches tall, outer bracts ovate acute dry, ribbed one inch long,  $\frac{1}{2}$  inch wide. Inner bract utricular nearly as long, enclosing a single flower, six-lobed, and split nearly to the base on the inner face, lobes  $\frac{1}{8}$  inch long acute. Calyx utricular longer than the corolla tube and shorter than the inner bract, 3 lobed lobes rounded obtuse. Corolla tube short and thick, lower lobes oblong obtuse thin punctate posticus one much broader rounded at the apex. Lip about as long, the claw broad, blade fan-shaped rounded buff yellow with red veins. Staminodes linear flat apex rounded. Stamen filament broad and thin three-veined rather short, anther cells thick linear, crest ovate rounded with curved linear lateral arms. Style longer, stigma funnel-shaped. Capsule oblong, fusiform one inch long. Seeds numerous black small.

Perak Hills. Maxwell's Hill. (Curtis 2714: Ridley 5190):  
Gunong Batu Puteh (Wray 1013).

COSTUS.

This genus has its headquarters in South America, and a number of species occur also in Africa. In Asia it is much rarer, though one species *C. speciosus* perhaps the finest in the whole genus occurs over the whole of tropical Asia. Two other species occur in the peninsula. It is one of the best marked genera in the whole order. The stems are tall and woody with the leaves arranged in a spiral, and in some species the stem itself grows spirally. Unlike any other genus except the allied *Tapeinocheilus* from New Guinea, the stems frequently branch. The ligule of the leaf forms a complete ring highest at a point nearest to the petiole, below which is sometimes a thin elevated ring fringed with hairs. The spike is terminal or rises directly from the rhizome with stiff sometimes spiny bracts. The calyx is tubular with usually distinct lobes. The corolla tube broad and no longer than the calyx, the lobes large lanceolate or oblong. There are no staminodes, nor stylodes. The lip is large obovate, and rolled into a trumpet shape.

The stamen is very broad and thin with the linear anther cells placed some way down and the apex curved up. The capsule is woody splitting on one side exposing a number of black angular seeds.

*Costus speciosus* Smith. Trans. Linn. Soc. i. 249. Bak. l.c. 250.

*C. arabicus* Jacq. Ic. t. i. *Hellenia grandiflora* Retz. Observ. VI 68. *Banksia speciosa* Koen. Retz. Obs. iii. 75.

Stems about 10 feet tall and  $\frac{1}{2}$  to one inch through covered with dull brown sheaths, often spiral, branched above. Leaves oblong acuminate cuspidate 9 inches long, 3 inches wide above dark green glabrous, beneath more or less pubescent, petiole  $\frac{1}{4}$  inch long thick pubescent, ligule short surrounding the stem emarginate opposite the leaf ciliate reddish. Spike ovate or oblong terminal, very rarely from the rhizome attaining a length of six inches, many flowered, flowers solitary in the bracts large showy and fugacious. Bracts, ovate mucronate not pungent red  $\frac{3}{4}$  inch long, upper ones smaller cartilaginous. Inner

bract  $\frac{1}{2}$  an inch long lanceolate acute keeled. Calyx short cartilaginous red, lobes very short, the two upper ones mucronate keeled, the lower one longer lanceolate not keeled, nor mucronate. Corolla tube very short hardly  $\frac{1}{4}$  inch long lobes equal, mucronate 2 inches long and one across, white sometimes tinted with rose. Lip very large obovate convolute 4 inches long and as wide, white with a central yellow bar, and an orange spot at the entrance to the tube, the centra hispid. Stamen 2 inches long, the filament broad oblong thin  $\frac{1}{2}$  an inch wide, hairy on the back, connective prolonged into an oblong acuminate upcurved crest, orange beneath. Anther narrow linear  $\frac{1}{2}$  an inch long. Style rather stout 2 inches long glabrous. Stigma transversely oblong quadrate, slit narrow subterminal. Ovary glabrous three-angled red three-celled. Capsule coriaceous oblong red crowned with the persistent calyx  $\frac{1}{2}$  an inch long each cell splitting longitudinally. Seed angled black about  $\frac{1}{8}$  inch long 4 or 5 in each cell.

Var. *argyrophyllus* Wall. Cat. 6555. Baker I.c. 250.

A more slender woodland form with more branched pubescent stems, leaves pubescent at the back, bracts and calyx less brightly colored, often plain green, flower spikes much smaller, lip smaller with no yellow spot in the mouth, petals often tinted pink. This variety keeps true under cultivation, but is hardly distinct enough to constitute a separate species.

Another variation I have once met with bore the flower spike on the rhizome instead of on the end of the leafy stem.

I have also seen a form of otherwise typical *C. speciosus* with no yellow on the lip, and forms occur in which the flower is more or less tinted with pink.

The common form occurs in damp open places, the var. *argyrophyllus* in denser woods.

Singapore abundant, Johore, Tanjong Kupang; Tengarah (Feilding), Malacca, common, var. *argyrophyllus* at Lubok Kedondong, and Jasin, Ophir; and Sungai Hudang. Sungai Ujong. Bukit Tampin. Selangor, Kwala Lumpur, etc. Pahang, Tahan river, Chengei. Perak, Hermitage Hill (var. *argyrophyllus*) Penang. This is the plant known as S'tawa or Tawar by the Malays. It is used in various ceremonies.

*C. globosus* Bl. Enum. Pl. Jav. 62.

Stems tall rather slender woody 6 to 8 feet high, bases covered with thin reddish brown sheaths. Leaves on one side of the stem only, sheaths about an inch long terete, ligule annular apex fimbriate with hairs, petiole short  $\frac{1}{4}$  inch long thick, blade broadly oblanceolate acuminate thin, 7 inches long by  $2\frac{1}{2}$  inches across dark green above lighter beneath, nerves above conspicuous with transverse reticulations glabrous above, midrib pubescent or not. Spike from the rhizome on a short thick woody horizontal or ascending peduncle 3 inches long and half an inch thick, compact many flowered three inches long and half an inch thick, prickly from the sharp points of the bracts. Bracts stiff cartilaginous broadly ovate with a sharp stiff mucro half an inch long striate red covered with short blunt processes, an inch long including the point. Flowers solitary in the bract, large and showy, but fugacious, cherry red. Bracteole like the bract but inequilateral and smaller. Calyx tubular cartilaginous with three equal pungent mucronate lobes an inch in length pubescent red. Corolla tube as long as the calyx lobes thin pubescent lanceolate acute mucronate an inch long  $\frac{1}{2}$  an inch wide. Lip very large and thin obovate involute nearly two inches long fringed with hairs. Stamen filament broad thin  $\frac{3}{8}$  inch across, connective oblong much wider than the anther, crest ovate obtuse recurved red, back of stamen covered with white wool, anther  $\frac{1}{2}$  an inch long oblong white. Style slender thickened upwards. Stigma transversely oblong, slit transverse.

Rocks and banks in wet woods.

Singapore, Bukit Timah. Johore, Gunong Panti. Selangor, Petaling, Gua Batu. Perak, Maxwell's Hill. Pahang, Tahan river. Sungai Ujong, Bukit Tampin; Perhentian Tinggi. A native also of Java.

*C. Kingii* Baker. Flor. Brit. Ind. l.c. 250.

Stem about six feet tall slender. Leaves oblanceolate oblong cuspidate, 8 inches long by 3 wide glabrous above, softly pubescent beneath, sheaths 2 inches long hispid ribbed, ligule hardly distinct with no long hairs on the edge. Spike from the rhizome on a long, stout peduncle over 2 inches long, conical cylindric,

three inches long by 2 through. Bracts ovate about  $\frac{3}{4}$  inch long, upper ones smaller lanceolate, mucronate, with a short point, covered with hair-like processes. Bracteole similar but smaller. Flowers solitary in the bracts, large and showy orange yellow. Calyx nearly one inch long tubular with three equal mucronate points hairy. Corolla tube 6 inches long wide, lobes oblong mucronate, pubescent. Lip convolute obovate 3 inches long and 2 inches wide. Stamen filament oblong rather short white woolly, tip rounded orange.

Penang, Pulau Butong (Curtis. 1976) Balik Pulau, fl. July. Perak, Larut Hills (King's Collector).

This is very near *C. globosus* Bl. but is distinguished by its pubescent leaves, narrower more hairy bracts, with less long and sharp points, and orange yellow flowers. The flowers are about three inches long. The lip is not so wide as that of *globosus* and is edged with hairs.

#### ZINGIBER.

This genus is very well marked by the curious prolonged point of the anther which occurs in no other genus here. The plants are all comparatively small, the stems being one or two feet tall, with the exception of one or two kinds which attain a height of six feet. The rhizome is usually thick and more or less aromatic. The spikes rise directly from the rhizome in all our species but abnormal forms occur in which they are borne on the ends of the leafy stems. I have seen this in the cultivated ginger *Z. officinale* L. and in a plant allied to if not identical with *Z. gracile*. The spikes are cylindrical or conical, with large broad red or yellow bracts, in each of which are one or more flowers. These are yellowish white, sometimes spotted with pink or mottled with black, one or two only open at a time and they last but a day. The calyx is tubular and short. The corolla tube projects but little beyond the bract, and the lobes are lanceolate or oblong. The lip is three lobed, the side lobes are turned up and I believe are really the staminodes which are joined to the true lip by their lower edges. The stamen is narrow and prolonged at the top into a long curved beak, which almost touches the lip over which it is curved. The style runs to the end of this beak. The fruit is a thin walled

capsule transparent and white and almost hidden in the bracts. When ripe it splits into its three segments and shows the black angled seed covered with a very thin white aril.

The Zingibers inhabit dense jungles, but two cultivated species can be found in waste ground near villages.

*Z. Zerumbet* Sm. Exot. Bot. ii. 105 t. 112. *Z. spurium* Koenig. Retz observ. iii. 60.

Rhizome fleshy yellow inside, white when old, bitter at first aromatic. Stems short and stout about 1— $1\frac{1}{2}$  foot high. Leaves crowded broadly lanceolate glabrous 4 to 6 inches long,  $2\frac{1}{2}$  to 3 inches wide, glabrous above with hairs on the midrib beneath ligule  $\frac{1}{2}$  an inch long papery brown. Spike globose to oblong 3 inches long, blunt on a stout peduncle covered with sheaths 3—4 inches long. Bracts broad rounded at first green eventually red, edges paler and hairy. Calyx spathaceous half an inch long, white. Corolla tube graceful twice as long, white, lobes lanceolate acute. Lip broad and short lateral lobes rounded, median orbicular to subovate retuse, pale yellow with an orange central bar, sometimes faintly mottled pink. Stamen short. Capsule oblong cartilaginous white splitting in 3 seeds oblong black ribbed covered by thin sweet aril.

Common in orchards and round villages, Singapore, Malacca, Selangor. The Lampoyang of the Malays used in native medicine.

*Z. officinalis* Rosc. The true ginger of commerce is cultivated here but never establishes itself as *Z. Zerumbet* does. It is known as Haliya. The leaves are narrow, the stems short. The spike which I have seen borne on the end of the leafy stem, is usually borne directly on the root stock. It is green with mottled black and yellow flowers, rarely however produced, and the fruit has never yet been seen. It is not known to occur wild anywhere.

*Z. Kunstleri* King. ms.

A herbaceous plant more like a shrub 4 to 6 feet high. Leaves lanceolate acuminate more than a foot long and three inches wide narrowed at base but not distinctly petioled, ligule very short. Flowering stem over a foot tall rather stout cov-

ered with sheathing leaves upper ones larger and uppermost with an ovate blade 2 inches long and one across. Spike short and broad (a capitulum) about three inches long and through. Bracts lanceolate apices deflexed. Flowers shortly protruding. Corolla tube slender, terete, lobes narrow lanceolate acute. Lip narrow shorter than the lobes, lanceolate acute, lateral lobes indistinct, hardly elevated. Anther longer than the lip, cells narrowly oblong, beak about as long as the cells narrow. Perak, open old jungle, rich rocky soil, 2000 to 2500 feet, August 1884. Flower-stem a rich light brown and pink. Flower pale white reddish and brown inside. (Kunstler, No. 2219).

I have never seen this plant, and take the description from a drawing and notes by Kunstler. It is a very striking and distinct plant in its round dense head of flowers and broad bract-like sheathing leaves just beneath it. The narrow lip distinctly shorter than the petals, and showing no large lateral lobes as in other species is also quite peculiar.

*Z. spectabile* Griff. Notulæ. iii. 413.

A very large noble species, with stout stems 7 feet tall,  $\frac{1}{2}$  an inch through, glabrous slightly flattened. Leaves about 25, rather thin textured lanceolate mucronate subdistichous a foot long, 4 inches across dull green above, paler beneath, ligule thin rounded bilobed  $\frac{1}{4}$  inch long. Scapes stout a foot long or more, covered with green sheaths, and bearing a showy spike a foot long. Bracts stiff ovate cartilaginous edges recurved, blunt, an inch long at first yellow then becoming scarlet. Flowers solitary in the bracts. Calyx spathaceous subobtuse shortly split  $1\frac{1}{2}$  inch long striate white. Corolla tube  $1\frac{1}{2}$  inch long, lobes lanceolate acute, upper one  $1\frac{1}{2}$  inch long,  $\frac{1}{2}$  inch across, lower ones narrower connate for half their length and adnate to the lip. All yellowish white. Lip 3 lobed broad a little shorter than the petals, lateral lobes broad rounded, median ovate bifid shortly at the apex, base and middle cf lip thickened grooved, lemon yellow mottled with deep purple nearly black at the tip. Anther broad fleshy ocre yellow, appendage long curved acute purple. Stigma elliptic fringed all round with transparent processes. Capsule one inch long fleshy. Seed black with a white aril.

Malacca, Panchur. Negri Sembilan, Bukit Taipin. Selangor, Petaling, Caves, Kwala Lumpur. Pahang, Kwala Luit; Tahan (2407) Perak, Larut. King's collector (3205). Dindings at Lumut. Penang, Pulau Butong (Curtis 1978.)

The largest and grandest species known and well worthy of its specific name. The large showy spikes at first bright yellow then becoming brilliant red, with the strange black and yellow flowers make it a plant well worth cultivating.

*Z. chrysostachys* n. sp.

Stems graceful slender about 2 feet tall,  $\frac{1}{8}$  inch thick purplish, leaves about ten rather distant lanceolate acuminate dark green, thin textured 5 inches long and  $1\frac{1}{2}$  inch broad shortly petioled, ligule inch long oblong. Scapes about six inches tall with a peduncle 2 inches high, rather stout and covered with red sheaths. Spikes four inches long oblong, with broad truncate retuse bracts bright yellow. Flowers solitary. Corolla tube short white, lobes lanceolate acute one inch long white. Lip with a narrow linear base three lobed about as long as the petals lateral lobes ovate obtuse white, median lobe and disc between the lateral lobes white but mottled and marbled almost all over with crimson, apex shortly bifid. Stamen, filament linear, anther cells elliptic but little narrower than the connective. Beak curved acute thickly spotted with pink.

Perak on Maxwell's Hill about half way up (5199). (Curtis 2716.) (Wray 3549.)

*Z. citrinum* n. sp.

Stems stout one foot tall. Leaves dark green pubescent beneath broadly lanceolate subacute with the chief veins prominent, 8 inches long and four inches wide, petiole short or none, ligule very short rounded. Spike oblong blunt 4 or 5 inches long on a stout green peduncle 3 inches long. Bracts broad rounded bright lemon yellow, becoming dull pink in fruit. Calyx dilated transparent white subacute apex bifid  $\frac{3}{4}$  inch long. Corolla tube graceful  $2\frac{1}{8}$  inch long yellow. Dorsal petal lanceolate subacute apex incurved yellowish, laterals connate and adnate to the lip for two thirds of their length,  $\frac{3}{4}$  inch long. Lip

shorter than corolla lateral lobes large oblong rounded, median lanceolate obtuse, yellow. Stamen long beak acute, anther cells grey, pollen flesh colour.

Selangor, Ginting Peras, Ginting Bidai, and Dusun Tua (7797). Perak, Ulu Bubong. (King 10263).

*Z. graci'e* Jack. Malay Miscell. i. No. 1. Bak. Fl. Brit. Ind. l.c. 246.

Stems slender 2 feet or more tall. Leaves ovate to ovate lanceolate acute six inches long  $2\frac{1}{2}$  broad light green paler and pubescent beneath, ligule short. Spikes cylindric acute at the apex and tapering into the peduncle 4 to 6 inches long, peduncle 6 to 12 inches long. Bracts pink, ovate broad blunt or acute about an inch long. Flowers thin yellowish white. Calyx very thin semitransparent, lobes long lanceolate acute. Corolla tube an inch long, lobes lanceolate acute as long, upper one a little broader. Lip lateral lobes oblong rounded  $\frac{1}{2}$  an inch long, mid lobe shorter than petals narrow deeply bifid lobes acute, narrow. Stamen filament short, anther elliptic beak long curved. Capsule  $\frac{1}{2}$  inch long elliptic. Seeds 2 or three, ovoid black flat in front rounded behind  $\frac{1}{4}$  inch long.

Singapore, Bukit Timah, Malacca, Sungai Hudang, Mt. Ophir, Pahang, Tembeling; Tahan, Selangor, Kwala Lumpur; Bukit Hitam. Penang.

*Var. elatior.*

A very much taller slenderer plant with stems about five feet tall, leaves narrow linear lanceolate acuminate 10 inches by 1, peduncle 18 inches and spike 7 or 8.

Hills at 2000 feet or upwards. Penang Hill. Perak, Maxwell's Hill.

King No. 7954. Possibly a distinct species.

*Z. puberula.* n. sp.

Stems 6 to 8 feet tall with numerous leaves, about  $\frac{1}{2}$  an inch thick. Leaves oblong elliptic acuminate, a foot long  $3\frac{1}{4}$  inch across, above deep green, glabrous, beneath paler covered especially on the stout midrib with brownish fur, petiole thickened  $\frac{1}{4}$  inch long, broad, thickly covered with brown wool, ligule ovate bilobed, lobes blunt  $\frac{3}{8}$  inch long and like the sheath covered with brown wool. Spikes numerous fusiform acute pink 3 to 6 inches

long with an equally long peduncle  $\frac{3}{4}$  inch thick. Bracts ovate obtuse pubescent margined with brown fur. Inner bract lanceolate acute semitransparent white over  $\frac{1}{2}$  an inch long, inch across. Calyx spathaceous one inch long shortly split apex truncate white. Corolla tube 2 inches long projecting beyond the bract  $\frac{1}{8}$  inch through, white, lobes thin creamy yellow lanceolate acute an inch long, dorsal  $\frac{1}{4}$  inch across, laterals narrower and connate for a quarter of their length and adnate to the lip. Lip shorter than the petals, three-lobed, lateral lobes oblong rounded, median longer oblong blunt all creamy white with yellower points (rarely bright canary yellow). Anther narrowly oblong  $\frac{1}{2}$  an inch long brownish red, pollen creamy white, beak  $\frac{1}{2}$  inch long yellow. Stigma transverse narrow, edged all round with rather long processes.

Singapore, common, Serangoon Road, (No. 4613) Bajau, Bukit Timah, Johor, Tanjung Kupang. Selangor, Ginting Bidai (No. 7798).

This is closely allied to *Z. gracile* and *Z. Griffithii* but is a very much bigger plant than either, and is very distinct in the pubescence of its leaves and bracts, and its long corolla tube. A plant cultivated in the Botanic gardens bore canary yellow flowers with the midlobe of the lip longer than usual and oblong. It also produced a spike on a peduncle 7 inches long covered with long pubescent sheaths at the base of the spike. The sheaths passed into narrowly oblong pubescent bracts, longitudinally striped red and green, and three of the upper ones bore ovate lanceolate blades half an inch long and  $\frac{1}{4}$  inch wide.

*Z. Griffithii* Baker I.c. 246.

Stems about three feet tall,  $\frac{1}{4}$  inch through slightly compressed striate. Leaves elliptic acuminate 8 inches long, 3 inches across glabrous deep green above paler pubescent beneath, sheaths split to the base pubescent, ligule  $\frac{1}{8}$  inch long rounded deeply emarginate brown pubescent, petiole thick nearly  $\frac{1}{4}$  inch long. Spikes fusiform 4 or 5 inches long on a stout peduncle 3 inches long, finely pubescent pink. Bracts broadly ovate one inch long and as broad. Flowers solitary yellowish white. Calyx very thin spathaceous  $\frac{1}{2}$  an inch long. Corolla tube one inch long, lobes lanceolate acute  $\frac{3}{4}$  inch long, lower ones connate

for about  $\frac{1}{2}$  their length. Lip a little shorter, lateral lobes rounded, median lanceolate acute. Anther oblong brown, beak curved yellow. Stigma transverse fringed all round with hairs.

Singapore, Bukit Timah, etc. common. Johore, Bukit Tanah Abang; Batu Pahat (Kelsall). Malacca, Bukit Sadanen (1434 Goodenough). Perak, Tanjung Hantu; Bruas (Dindings No. 7224); Pahang, Tahan River.

*Var. major.*

A very much larger plant than usual; leaves elliptic oblong acuminate  $1\frac{1}{2}$  foot long, 5 inches across; sheaths glabrous, petiole almost wanting. Spike glabrous, thick with broad bracts, Flower 3 inches long. Corolla tube 2 inches.

Pahang, Kwala Tembeling. Perak, Bujong Malacca (No. 9820). A very large and stout plant, about five feet tall, with thick stems broad stiff leaves and much larger flowers. Perhaps a distinct species but the form of the flowers seems to me the same.

AMOMUM.

This genus has been used to include a large number of very different plants, but I would propose to retain it for those only which were included under the section *Eu-amomum* of Bentham. Thus restricted, the Amomums are plants with leafy stems from two to 6 feet tall, the inflorescence a short dense obconic spike rising on a short peduncle from the root stock. The bracts lanceolate or ovate, containing one or more flowers enclosed in thin bracteoles. Calyx tube as long as the corolla tube, the corolla lobes oblong or lanceolate. Staminodes absent. Lip large, often very large, and convolute. Stamen broad, with a rounded crest, and two horn-like or linear processes projecting from the upper angles. The style shorter than the crest. The fruit usually a succulent capsule, often covered with processes, and containing a large number of seeds.

This excludes from the genus as described in the Flora of British India, the genera *Hornstedtia* (*Achasma* and *Stenoachasma*), *Phaomeria* and *Cenolophon*, and besides several other species such as *Amomum biflorum* Jack. (an *Ellettariopsis*) which appears to have got in by mistake.

*A. Zanthophlebium* Bak. l.c. 241. *A. stenoglossum* Bak. p. 234.

Stems six feet tall  $\frac{1}{2}$  inch through. Leaves two feet or more in length, two to four inches wide oblong lanceolate with a long cusp, glabrous, petiole stout about an inch long ligule short truncate  $\frac{1}{4}$  inch long pubescent. Spikes several on a plant, loose obconic six inches long or usually less on subterranean peduncles, stout 4 to 6 inches long covered with sheaths. Bracts oblong glabrous about 2 inches long and one inch across spreading, rather stiff cherry red. Bracteoles spathaceous keeled three lobed, lobes unequal dull pink. Flowers solitary. Calyx one inch long split to the base on one side 3-lobed, lobes unequal deeply cleft blunt pubescent, brownish pink. Corolla tube thick  $1\frac{1}{2}$  inch long, lobes unequal, upper one broad ovate obtuse  $\frac{1}{2}$  an inch wide, laterals narrowly oblong obtuse  $\frac{1}{4}$  inch across, cherry red. Lip convolute entire little longer than the petals, obovate apex rounded yellow densely marked with red streaks, and spots. Stamen filament linear broad white with a red base anther  $\frac{1}{2}$  an inch long linear yellow, cells parallel linear, pollen white, connective prolonged into a short rounded entire crest behind the stigma, and into two curved linear horns from the upper angles of the anther, yellowish tipped red. Style fusiform, stigma cup-shaped ocreous. Stylodia in the form of a short lobed disc almost surrounding the style. Capsule elliptic oblong finely pubescent, an inch long. Seeds numerous small black. Hab. dense damp jungles, flowering in May and June.

Singapore, Bukit Timah, Bukit Panjang, etc. Malacca (Main-gay), Perak. Larut 500-1000 feet (King 1957), Bujong Malacca at 3000 feet elevation.

I have examined the plant on which *A. Stenoglossum* Bak. was based and find the stamen exactly the same as that of *A. Xanthophlebium*, and not crestless, as described.

*A. flavum* n. sp.

Stems tall and stout 12 to 15 feet pubescent. Leaves a foot long and 2 inches wide oblong lanceolate with a long point pubescent beneath, petiole very short, ligule truncate, as long. Spikes several borne on branches of the rhizome covered with ovate sheathing leaves  $\frac{1}{2}$  to one inch long, peduncle  $1\frac{1}{2}$  inch long. Spikes subglobose about an inch long and  $2\frac{1}{2}$  inch across, com-

pact. Bracts ovate mucronate brown. Bracteole spathaceous pubescent bilobed,  $\frac{1}{2}$  inch long, lobes mucronate. Calyx pubescent  $1\frac{1}{2}$  inch long, tubular split down the back bilobed, lobes mucronate. Corolla tube as long, lobes ochreous upper one obovate hooded  $1\frac{1}{2}$  inch long, laterals narrower oblong lanceolate Lip large, one inch across convolute obovate, margins recurved ribbed, yellow spotted with red in the centre. Stamen filament straight rather broad pale orange, anther narrow linear yellow. Crest reniform apices rounded with a short central projection,  $\frac{1}{4}$  inch wide veined orange. Style shorter than the crest. Stigma cup-shaped.

Penang, Waterfall Gardens (Curtis 2275), Penara Bukit (7226). Sumatra, Lampongs, (H. O. Forbes).

Allied to *A. Xanthophlebium* Bak. but with smaller orange flowers brown ovate bracts and a very different crest.

*A. lappaceum* n. sp.

Rhizome stout. Stems tall and stout about 6 feet or even more. Leaves oblong lanceolate acuminate cuspidate somewhat narrowed at the base glabrous, not petioled, 18 inches long by four wide. Spikes numerous gradually elongating to 16 inches in length, cylindrical, rachis stout covered with brown tomentum. Flowers numerous shortly pedicelled ( $\frac{1}{4}$  inch). Bracts oblong bifid at apex, points rounded, red,  $1\frac{1}{2}$  inch long, 1 inch wide. Bracteole tubular  $\frac{1}{2}$  inch long trifid, apices pink. Calyx tubular one inch long trifid apices acute equal, red. Corolla tube as long as the calyx, lobes linear upper one broader, oblong about half an inch long ochre yellow. Lip obovate rounded shortly bilobed. Staminodes none. Stamen rather short, anther  $\frac{1}{2}$  an inch long, crest none. Ovary pubescent. Fruit oblong  $\frac{3}{4}$  inch long covered with conic subulate spines, pedicels  $\frac{1}{2}$  an inch long stout.

Dense woods, Selangor, Ginting Peras (7802). Perak (Scortechini 222) Wray; Maxwell's Hill, Ridley.

The most peculiar thing about this plant is the way in which the flower spikes gradually lengthen as the flowers open till they attain a length of 18 inches, and the pedicels which in the flower are about  $\frac{1}{4}$  inch long become twice that length. The fruit is eaten by Sakais.

*A. ochreum* n. sp.

Stems tall and stout. Leaves oblong 3 feet long and 7 inches wide apex broad cuspidate glabrous, petiole hardly distinct very thick  $\frac{1}{2}$  inch long ligule oblong obtuse. Spike short globose elongating in fruit, peduncle  $1\frac{1}{2}$  inch long. Bracts lanceolate  $1\frac{1}{2}$  inch long thin. Bracteole tubular  $\frac{1}{2}$  inch long edge hairy. Flowers large yellow. Calyx as long as corolla, tube 1 inch long lobes lanceolate subobtuse 3-nerved tipped with hairs. Corolla tube thick lobes oblong obtuse  $\frac{3}{4}$  inch long dorsal wide hooded. Lip very large over an inch long rounded convolute, yellow edge denticulate. Anther oblong  $\frac{1}{2}$  an inch. Fruit large globose green succulent covered with short processes.

Selangor, Ginting Bidai.

*A. perakense* n. sp.

Rhizome stout woody with numerous stiff woody roots. Stems slender about  $\frac{1}{4}$  inch through. Leaves narrow lanceolate acuminate with a long point base narrowed, petiole hardly distinct, 8 inches long one inch broad, ligule very small. Scape several peduncles 2 inches long flexuous. Spike about as long rather narrow subcylindric. Bracts narrow oblong caducous  $\frac{3}{4}$  inch long. Bracteole oblong obtuse flat. Calyx tube half an inch long dilated upwards three-lobed lobes lanceolate acute. Corolla tube slender barely longer than the calyx upper one largest  $\frac{3}{8}$  inch long. Lip obovate longer than the corolla. Staminodes longer than the filament base linear apex setaceous, Stamen anther long narrow  $\frac{1}{4}$  inch long, crest rounded distinct, filament short. Stigma obconic.

Perak. Maxwell's Hill. June 1893.

I have only collected this once and describe it from dry specimens. It is remarkable for its woody rhizome raised above ground, with stiff woody roots, like that of a *Geostachys* and its lengthening spike, of which the bracts fall off as it develops, leaving a bare rachis only bearing the short pedicels. In its large staminodes and small flowers it resembles *Z. macrodons* Scott.

*A. testaceum* n. sp.

Stems about 12 feet tall, clubbed at the base, stout. Leaves

lanceolate cuspidate gradually narrowed to the base over 2 feet long and 4 inches wide glabrous; ligule very short. Spikes several cylindric or fusiform 3 to 4 inches long on peduncles 6 inches long covered with green sheaths. Bracts papery striate and pale brown oblong subacute  $1\frac{1}{2}$  inch long  $\frac{1}{2}$  an inch wide silky pubescent. Bracteoles tubular fawn-color, two lobed, silky  $\frac{1}{2}$  an inch long. Calyx fawn-colored three-lobed, lobes rounded silky. Corolla tube barely longer, lobes linear oblong, white blunt  $\frac{1}{2}$  inch long. Lip spoon-shaped entire, little longer than the petals white apex yellow, with a short carmine line at the base on each side. central bar thickened. Staminodes oblong truncate, buff. Stamen filament broad, broader than the anther, anther short thick and quadrate upper angles produced oblong obtuse, crest entire oblong blunt recurved. Style thickened upwards above the anther. Stigma very large oblong, much bigger than the crest, ovary silky.

Selangor, Caves Kuala Lumpur (8173) Pulau Tioman.

A dull colored plant with pale fawn colored bracts and inconspicuous white flowers. It flowers in December.

*A. cylindraceum* n. sp.

Stems six feet tall. Leaves oblong lanceolate acute narrowed at base, grey-green, 18 inches long by 2 wide glabrous closely veined, with a stout keel, petiole none, ligule very large  $\frac{1}{2}$  inch long bifid lobes acute. Spikes cylindrical stout 6 inches long, on strong peduncles of equal length, covered with rufoustomentum and with large oblong sheaths an inch long. Bracts ovate oblong stiff brown. Bracteole  $\frac{1}{2}$  inch long truncate bifid, tubular. Calyx tubular  $\frac{3}{4}$  inch long truncate pubescent. Corolla tube an inch long slender pubescent, lobes oblong obtuse the upper one hooded, orange. Lip three-lobed, lobes rounded darker orange. Staminodes lanceolate acuminate. Anther crest oblong with two points at the side. Fruit globose rough, with numerous low ribs about  $\frac{1}{2}$  inch long brown.

Dindings, Woods at Telok Sera.

Flowers in January, fruit in March. This is allied to *A. testaceum* in its cylindrical spike and small flowers.

*A. uliginosum* Koen. Retz. Obs. iii. 56. Baker. l. c. 247.

Rhizome with very long cylindrical brauches about  $\frac{1}{4}$  inch

through covered closely with brown sheaths. Stems about 5 feet tall or less. Leaves narrowly lanceolate narrowed to the base long-cuspidate one foot long, 1 inch wide, petiole very short or absent, ligule  $\frac{1}{8}$  inch long rounded. Spikes usually distant from the stems on a branch of the rhizome, obconic, peduncled, peduncle 1 to 4 inches long covered with sheaths. Bracts elliptic ovate pink or brown. Calyx tubular pink  $\frac{1}{2}$  an inch long, lobes narrow acute. Corolla tube a little longer, lobes linear acute narrow rosy. Lip boat-shaped narrowed at the base geniculate at the extreme base, with thickened deep maroon knees, white with a median yellow bar, a crimson line on each side of it and a few crimson spots at the base,  $\frac{1}{2}$  an inch long. Stamen shorter than lip incurved, filament rather broad white, anther oblong, crest three-lobed, lobes squared, the centre one retuse. Stigma club-shaped. Fruit globose covered with soft red processes,  $\frac{1}{2}$  an inch through.

Malacca, Bukit Sedanen (Derry 238). Sungai Ujong, Bukit Tampin. Pahang, Kwala Tembeling, Kota Glanggi, etc. (2404). Perak, Lumut. Dindings. Penang, Balik Pulau. Kedah, Yan.

This inhabits woods and banks, where its long branching rhizomes may be seen creeping for some distance.

It is said by Derry to be planted by the Jakuns for its eatable fruit and it is known to the Malays as Pua Hijau, Pua Gajah, and Tepus Merah. Its boat-shaped white lip with a yellow bar edged with pink and round red fruit covered with processes like those on a Rambutan make it easily recognized.

Koenig collected the type of *A. uliginosum* at Raput Nok in Junk Ceylon, and his description applies very well to this plant which I have found as far north as Kedah. He describes the crest however 4 lobed, perhaps counting the retuse central lobe as two lobes.

*A. hastilabium*. n. sp.

Rhizome aromatic rather slender woody. Stem 3 or 4 feet tall rather stout glabrous. Leaves oblong lanceolate acuminate at both ends glabrous, drying grey, 9 to 18 inches long and 2 to 4 across, petiole  $\frac{1}{2}$  an inch long ligule ovate rounded  $\frac{1}{4}$  inch. Spike short obconic compact 1 - 2 inches tall on a stout peduncle

an inch long. Bracts ovate lanceolate ribbed stiffly papery, light brown, mucronate, an inch long  $\frac{1}{2}$  an inch wide. Bracteole lanceolate acute longer than the calyx. Flowers open two at a time. Calyx tube  $\frac{3}{4}$  inch long cylindric truncate white narrowed at the base dilate above, deeply split in front. Corolla tube an inch long slender terete, lobes oblong blunt white  $\frac{1}{2}$  inch long, ribbed. Lip broadly hastate, with a narrow linear base, lateral lobes rounded thin white, midlobe narrow oblong obtuse orange central bar dark orange with purple marks at the sides; one inch long and wide. Staminodes lanceolate acuminate apex setaceous white. Stamen filament broad linear white, anther oblong linear, cells dark red, crest broad oblong truncate pale orange longer than the style. Fruit globose about  $\frac{1}{2}$  an inch long with strong ribs, hairy fawn-colored.

Singapore, Bukit Timah, Selitar. Johore, Gunong Panti, Selangor, Dusun Tua. Perak. Wray (3476).

Flowers in May. Perhaps as closely allied to *A. uliginosum* as to any of our species. The long corolla tube, and spade-shaped lip are unusual.

*A. micranthum* n. sp.

Rhizome creeping far slender with long woolly roots. Stems slender about 2 feet tall. Leaves narrow lanceolate acuminate, 6-7 inches long  $\frac{1}{4}$  inch wide dark green glabrous, petiole very short or none, ligule very short truncate. Spikes short, obconic dense, one inch long on peduncles of the same length. Bracts narrow lanceolate acute pubescent  $\frac{1}{4}$  inch long, brown. Flowers very small about half an inch long. Calyx a little shorter than the corolla tube, tubular with three short acute lobes, green. Corolla tube a little more than  $\frac{1}{4}$  inch long lobes narrow linear, pale yellow. Lip oblong dilated towards the apex, then suddenly narrowed and bifid, centre depressed, with a round nectary at the base, pale yellow dotted with pink. Staminodes short linear. Stamen filament tapering upwards, and anther small oblong, with the upper angles produced into acute curved processes, and a small entire rounded crest. Style very slender. Fruit small globular purple brown covered with soft processes.

Penang Hill, in several places but not common. (Curtis 2884.) Negeri Sembilan on Gunong Angsi.

Distinct in its narrow grassy leaves, and very small flowers.

*A. macrodus* Scott. Nuov. Giorn. Bot. Ital. xviii 309 from the Kinta Valley, Perak, has well developed staminoles, and a simple anther crest. It is perhaps a *Gastrochilus*. I have never met with it.

#### HORNSTEDTIA.

This genus was founded by Retz (Observationes iii.) on the two common species of the peninsula *H. scyphus* and *H. Leonurus*. Later Blume described some species under the name of *Donacodes*, others he referred to the genus *Elettaria*. Griffith overlooking Retz' work, made two genera *Stenochasma* and *Achasma*, and finally they were all placed under *Amomum* by Bentham and Hooker, who was followed by Baker. I propose to restore Retz' genus and to include also under it the beautiful plants classed as *Phæomeria* Lindl. and *Nico/aia* Horan. The genus thus may be described. Plants with tall rarely short leafy stems, often 12 to 15 feet tall. Leaves numerous oblong petioled. Spikes radical on short or long peduncles, with large outer bracts usually red, ovate or oblong, forming a cup or spreading. Bracteoles thin tubular. Flowers sessile numerous. Calyx spathaceous thin. Corolla long or short-tubed, lobes oblong narrow not spreading. Lip narrow often long, linear or narrowly oblong, the sides at the base convolute over the stamen. Stamen short and thick, anther fleshy, bent at an angle with the filament, crest very small or none. Staminodes none. Capsule oblong with thin cartilaginous walls and numerous black seeds, or (section *Phæomeria*) sub-globose with a green fleshy pericarp and bony walls and brown angled seeds. Species about 20 known, scarce in India abundant in the Malay peninsula and the Western part of the Malay archipelago.

Section 1. *Eu-hornstedtia*. Spikes on very short peduncles buried in the ground. Tube of flowers very long, lip long. Fruit concealed in the persistent outer bracts, thin-walled oblong.

Section 2. *Phæomeria*. Spikes on tall peduncles, cone-shaped or cup-shaped. Tube of flowers and lip short. Fruit globose woody the outside green and fleshy, arranged in a ball, the bracts having disappeared.

To the former section besides those of the Malay peninsula belong *Alpinia linguiforme* Roxb. of India, and apparently from

the description, *Elettaria foetens* Bl. *E. minuta*, *E. coccinea* and *E. minor* Bl. *E. pininga*, *E. rubra*, *E. paludosa*, *E. tomentosa*, Miq. all of Java, but the descriptions published of these are inadequate. To the section 2 belong *H. imperialis*, *H. Maingayi*, *H. venusta*, *H. hemisphaerica* of the Peninsula, *H. involucrata* (*Amomum involucratum* Benth.) of Ceylon, *H. Fenzlii* (*A. Fenzlii* Kurz.) of the Nicobars. *H. pallida* (*Elettaria pallida* Bl.) *H. macrocephala*, (*E. macrocephala* Miq.)

*H. scyphus* Retz. Observ. vi. 18. *Amomum scyphiferum* Koenig. Retz. Observ. iii. 68. Bak. l.c. 237, *Stenochasma urceolare* Griff. Notul. iii. 431.

Rhizome stout and woody, stems ten feet tall  $\frac{1}{2}$  an inch through. Leaves oblong base oblique, 2 feet long and six inches wide dark green and glabrous above, paler beneath and hairy along the midrib or all over, petiole  $\frac{1}{4}$  inch long, ligule oblong obtuse hairy, nearly half an inch long. Spike cylindric on a short stout peduncle, covered with oblong ovate bracts red, outer ones empty 2 inches long  $1\frac{1}{2}$  broad longitudinally and transversely ribbed, thick and stiff in texture. Bracteoles lorate lanceolate 2 inches long  $\frac{1}{4}$  inch wide, tips dark red with a scarious margin, minutely mucronate. Flowers solitary in the bracts opening one or two at a time,  $3\frac{1}{2}$  inch long. Calyx spathaceous an inch long three-lobed flattened red, lobes rounded red tipped with white. Corolla tube much longer slender red, the lobes lanceolate oblong, upper one hooded  $\frac{3}{4}$  inch long  $\frac{1}{4}$  wide, lower ones shorter adnate to the lip below for the greater part of their length, all deep shining red. Lip a little longer than the upper petal, side lobes rounded embracing the stamen, apex fleshy tongue-shaped dark red pubescent especially in the centre. Stamen filament short broad, anther cells linear grey, upper part only polliniferous lower part pubescent crest ovate rounded. Staminodes absent. Style slender white. Stigma red cup-shaped, terminal pubescent. Styloides forming a tube round the base of the style with their tips free, half an inch long, ovary glabrous 3-celled, ovules numerous. Capsule oblong obscurely triangular  $\frac{3}{4}$  inch long,  $\frac{1}{4}$  inch through yellowish white, thinly cartilaginous. Seeds numerous black smooth truncate angled  $\frac{1}{16}$  inch long enclosed in an acid pulp.

Common in woods. Singapore very common. Johor, Tan-jong Bunga. Selangor, Bukit Hitam; Petaling. Malacca. Also in Pulau Buru, South of Singapore. Mandan River, Siak, Sumatra and Penghulu Ampat. Sarawak (Haviland).

*H. Ophiuchus. Amomum ophiuchus* Ridl. Trans. Linn. Soc. l.c. p. 381.

Stems about 12 feet tall clubbed at the base. Leaves oblong lanceolate glabrous  $1\frac{1}{2}$  feet long 3 inches wide, petiole  $\frac{1}{2}$  an inch long, ligule ovate oblong obtuse pubescent. Spike fusiform 5 inches long. Bracts ovate or ovate lanceolate acute mucronate ribbed silky pubescent 2 inches long and one wide red. Flowers 5 inches long red. Calyx tubular 3 inches long acute silky below glabrous above. Corolla tube graceful, lobes lorate cucullate shining red. Lip as long lorate apex hooded fleshy red with white edges pubescent inside. Stamen anther oblong emarginate with no crest pubescent red. Style slender. Stigma pubescent clubbed, ovary silky.

Pahang, Tahan woods.

Allied to *H. Scyphus* but the bracts are narrower and more acute and have not the cross bars of that species.

*H. grandis* n. sp.

Rhizome stout elevated above the ground. Stems tall and stout swollen at the base. Leaves oblong cuspidate nearly 3 feet long and 6 inches across glabrous petiole  $\frac{1}{2}$  an inch pubescent ligule longer pubescent sheaths pubescent. Spikes elongate oboconic cylindric 8 inches tall covered with ovate rounded bracts hispid on the edges and covered with transverse irregular elevations, the longitudinal ribs being rather obscure. Bracteoles narrow lanceolate. Calyx cylindric tubular 3 feet 2 inches long. Corolla tube nearly 5 inches long terete but dilated at the apex, upper lobe lanceolate obtuse one inch long, lower ones oblong lanceolate. Lip but little longer, lateral lobes little developed, apex rounded entire pubescent. Stamen filament  $\frac{1}{4}$  inch beyond the mouth of the corolla tube, anther  $\frac{1}{2}$  inch long, hairy, crest ovate acute. Style stout pubescent. Stigma cup-shaped pubescent, ovary glabrous. Stylodes an inch long narrow.

Perak, Maxwell's Hill. June 1893.

Nearly allied to *H. Scyphus* but much bigger in all its parts.

*H. conica* n. sp.

Stems stout about five feet tall. Leaves oblong lanceolate cuspidate 2 feet long 3 - 4 inches wide glabrous above pubescent or glabrous beneath, drying red, petiole  $\frac{1}{2}$  to 1 inch long, glabrous or hispid, ligule large  $\frac{1}{2}$  an inch long, ribbed longitudinally and with small transverse bars. Spike four inches long, fusiform acuminate. Bracts ovate acute upper ones narrower and longer, pink covered with a fine silvery tomentum, longitudinally ribbed. Bracteoles thin narrow glabrous. Flowers purplish pink shortly protruded. Calyx tubular ending in a long point 2 inches in length, silky at the base. Corolla tube very slender twice as long, dilated a little above, lobes oblong obtuse  $\frac{1}{2}$  inch long, purple pink. Lip longer, tongue-shaped blunt.

Singapore, Bukit Panjang. Johor, Gunong Panti. Selangor, Bukit Hitam; Langat.

The flower spike in this species dilates from a narrow base and then tapers to a point from which the flowers protrude but a short way, little more than an inch. The very long slender corolla tube and short entire lip are also peculiar points, it is allied to *H. ophiuchus*.

*H. Leonurus*. Retz. Observ. vi. 18. *Amomum Leonurus* Koen. Retz. observ. iii. 69. *Stenochama convolutum* Griff. Not. iii 433. *Amomum Ridleyi* Bak. Kew Bulletin 1892. 127.

Stems about 12 feet tall bearing about 20 leaves, Leaves oblong acuminate base truncate glabrous, polished dark green above a foot and a half long, and  $4\frac{1}{2}$  inches across petiole one inch long, ligule entire rounded blunt  $\frac{3}{8}$  inch long. Spike cylindric 3 inches long almost buried. Bracts lanceolate acute minutely silvery pubescent  $2\frac{1}{2}$  inch long and  $\frac{3}{4}$  inch wide. Flowers in pairs. Calyx tubular spathaceous split almost the whole way down on one side, apex entire 3 inches long. Corolla tube slender gradually enlarged upwards 3 inches long lobes linear oblong hooded, the upper one  $\frac{1}{4}$  inch across, the others not connate much narrower, red, one inch long. Lip hastate blunt, sides upcurved, apex longer fleshy, red, as long as the corolla. Stamen filament broad and flat, edges thickened centre depressed, deep red  $1\frac{1}{2}$  inch long anther oblong blunt  $\frac{1}{2}$  inch long, pubescent. Style very slender filiform red, stigma

clubbed. Styloides linear narrow.

Woods. Singapore, common. Johor, Gunong Panti. Malacca, Rim. (Griffith.) Pahang, Pulau Tawar.

Griffith's account of this curious plant is very accurate. The leaves are waved, and dark polished green. The flower spike imbedded in the ground silky pubescence on the bracts protecting the buds from injury by wet. The flowers are very inconspicuous in the dark damp jungle, but the pale colored tips of the corolla lobes is conspicuous enough to attract attention to them. The pollen when shed is protected by the pubescence on the anther from the effects of the surrounding wet in a very curious manner. The plant is known as Pua Hitam by the Malays.

*H. affinis* n. sp.

Leaves, lanceolate acuminate 8 inches long by 2 wide, minutely pubescent and fringed with rufous hair, petiole  $\frac{1}{4}$  inch long ligule longer covered with rufous hair. Spike cylindric 3 inches long, bracts oblong ribbed. Flowers four inches long. Calyx tubular bifid as long as the corolla tube 2 inches lobes short acute, base hispid. Corolla-tube dilated at the top, lobes linear oblong upper one hooded and enclosing the other two which are thinner and smaller. Lip shorter little more than half an inch long, hastate, the two side lobes large and rounded apex narrow blunt. Stamen nearly as long as the dorsal corolla lobe, filament broad and thin, anther as long as the filament, apex notched, no distinct crest, cells pubescent. Style slender, stigma small, ovary hispid.

Borneo, Sarawak, Kuching. (Haviland 1764).

Near *H. Leonurus* but differing in the pubescence. The leaves in the specimen are only the terminal ones, the lower ones are probably much larger. A closely allied plant, if not absolutely identical, was obtained by Mr. Fox on the Rumpin river in Pahang. It has a stout woody rhizome with several spikes, which however are too young to show the flowers.

*H. pusilla* n. sp.

Rhizome slender woody sinuous. Stems 8 inches tall very slender. Leaves few 3 or 4 elliptic lanceolate with a long point

6 inches long  $1\frac{1}{2}$  wide, the point, one inch, base broad, no petiole glabrous, ligule very small sheaths somewhat hispid. Spike small few-flowered on a peduncle half an inch long. Bracts ovate mucronate ribbed half an inch long glabrous red. Bracteole cylindric ribbed pubescent. Calyx short. Corolla tube short about  $\frac{1}{2}$  an inch lobes linear red. Lip narrow entire fleshy. Stamen filament short anther  $\frac{2}{3}$  inch long hardly retuse at the apex. Style filiform stigma cup-shaped pubescent. Stylodes  $\frac{1}{8}$  inch rather thick.

Pahang. K wala Tembeling.

The smallest species I have seen, easily distinguished by the few-flowered spike, the flowers somewhat resembling those of *H. Leonurus* but much smaller.

*H. pauciflora*. n. sp.

Stems rather slender terete distant 12 feet long. Leaves oblong cuspidate glabrous  $1\frac{1}{2}$  foot long 4 inches wide, petiole  $\frac{1}{2}$  an inch long, ligule lanceolate 1 inch. Spikes deeply sunk in the ground 2 to 4 flowered. Bracts narrow lanceolate acute fleshy, white, 2 inches long. Bracteole 2 inches long tubular bilobed, lobes acute white. Calyx narrow at the base dilate upwards trilobed, lobes acute, 3 inches long red. Corolla tube as long, upper lobe lanceolate subacute cherry red, lower ones shorter oblong obtuse deep red. Lip narrowly lanceolate obtuse apex barely enlarged, lateral lobes rounded, flame color, with the central bar thickened yellow. Stamen filament short, anther bent oblong emarginate deep red, pollen cells white. Style filiform, stigma cordate recurved white. Staminodes oblong truncate grooved, buff.

Selangor. Abundant at the Caves, Gua Batu. 1896.

This plant is remarkable for the inflorescence being reduced to but 2 or 3 flowers, with thin cartilaginous white bracts sunk in the ground so that only the upper part of the flowers appear.

*H. triorgyale* n. sp. *Amomum triorgyale* Bak. l. c. 237.

Stems 18 feet tall stout pubescent. Leaves oblong acute  $2\frac{1}{2}$  feet long 7 inches across glabrous above softly pubescent beneath, petiole  $\frac{1}{2}$  inch, ligule large. Spike short and broad ovate 4 inches long and 2 inches through. Bracts broad ovate 2 inches long and wide longitudinally ribbed pubescent deep rose

colour, inner ones lanceolate  $2\frac{1}{2}$  inches long rosy at the tips. Bracteoles bifid tubular 2 inches long. Calyx tubular bifid mucronate, lobes narrow, one subdivided 3 inches long, cherry red. Corolla tube as long, lobes linear oblong blunt, upper one the largest  $1\frac{1}{8}$  inch long, cherry red, lower ones one inch long  $\frac{1}{8}$  inch wide rosy. Lip broad oblong entire blunt one inch longer than the corolla cherry red. Stamen anther rather broad and thick notched, crest none. Styloides unusually long  $\frac{1}{4}$  inch lanceolate entire white.

Selangor, Ginting Peras (7806). Perak, Thaiping Hills (Dr. King 2105).

One of the finest and perhaps the biggest in the section. The rose colored inflorescence with the cherry colored lip are very beautiful.

*H. albomarginata* n. sp. *Amomum sphaerocephalum* Bak. l.c. 234.

Stems about four feet tall slender red glabrous. Leaves when young light green barred with red, when full grown dark polished green (drying red beneath) glabrous or finely pubescent beneath no petiole ligule short and broad. Spikes 2 inches long subcylindric few flowered. Bracts lanceolate mucronate red 2 inches long  $\frac{1}{2}$  an inch wide pubescent ribbed. Bracteoles in pairs thinner red edged with yellow hairs. Calyx tubular trifid  $1\frac{1}{2}$  inch long lobes tipped with yellow hairs. Corolla tube about as long lobes tipped with white hairs, lower ones shorter than the upper one, lying curved up over the lip. Lip 2 inches long sides curved up over the stamen edged white, apex narrow linear obtuse deep red. Stamen filament short deep red, anther oblong entire deep red, keeled on the back half an inch long pollen yellow. Style slender, stigma heart-shaped with a narrow linear groove.

Penang Hill abundant. Dec. 1895 (7233), Diudings, Lumut. Selangor, Petaling. Perak, Gunong Keledang.

I suppose this plant to be the *A. sphaerocephalum* Bak., but the spike is by no means spherical and the lip is usually at least entire, but in a plant flowered in the gardens I find some flowers with the apex of the lip three-lobed, while others are entire.

*H. velutina* n. sp.

Stems tall and stout. Leaves oblong lanceolate 15 inches long 4 inches wide glabrous above, velvety with long hairs beneath, base tapering into a petiole half an inch long, ligule as long, oblong obtuse velvety. Spike at first globose  $1\frac{1}{2}$  inch long elongating with growth, peduncle 2 inches long. Bracts oblong obtuse about an inch long velvety dark red. Bracteole oblong truncate pubescent dull red  $1\frac{1}{2}$  inch long. Calyx tubular pubescent trifid shorter. Corolla tube shorter than calyx, lobes short oblong rounded at the tip upper one a little longer. Lip oblong rounded bilobed, edges not meeting over the anther cherry red, the edges at the base whitish. Anther oblong retuse. Stigma deep red.

Borneo, Bongaya River.

*H. megalochilus*. *Achasma megalochelos* Griff. Notul. III. 426, Pl. CCCLV. *Amomum mega'ochilus* Bak. Flor. Brit. Ind. p. 236, *A. rubroluteum* Baker, l.c.

Stems stout and tall 12 to 15 feet, and  $1\frac{1}{2}$  inch through clubbed at the base. Leaves broadly oblong cuspidate base oblique rounded glabrous dark green, 2 to 3 feet long,  $3\frac{1}{2}$  to  $4\frac{1}{2}$  inches wide, petiole half to one inch long, ligule oblong rounded  $\frac{1}{2}$  inch long. Spikes 2 to 3 inches long on long subterranean branches of the rhizome deeply sunk in the earth peduncles  $1\frac{1}{2}$  to 1 inch long covered with ovate bracts. Bracts ovate acute mucronate strongly ribbed when dry, margins ciliate bright red, about an inch long. Bracteoles narrow linear lanceolate pubescent. Calyx 3 inches long trifid lobes acuminate. Corolla tube 2 inches long rather slender, pubescent within, lobes linear acute an inch long, shorter than tube of the lip red. Lip 2 inches longer than the corolla the sides rolled up at the base, spatulate, apex dilated entire or retuse, crimson edges yellow. Stamen filament short broad, anther short oblong about  $\frac{1}{2}$  an inch long emarginate with no real crest deep red. Style slender longer than anther, stigma triangular. Styloides oblong acute. Ovary pubescent.

Common in wet woods, often forming dense thickets.

Singapore (rare) Bukit Mandai. Pahang, Tahan Woods; Pekan. Malacca, Bukit Sadanen. Negri Sembilan, Bukit Tampin.

Selangor, Kwala Lumpur; Langat. Perak, Dindings, Lumut: Thaiping hills. Penang, Government Hill (Curtis 2419).

The brilliant crimson and yellow flowers appearing often dotted all over the ground are most attractive. In Griffith's description he has evidently intended to write of them "vivide coccineus," which has been printed *viridia coccineus*, and translated into "greenish red." *Amomum rubroluteum* Bak. collected by Maingay in Penang is this plant I should judge from its description. The back of the stamen is prolonged a little beyond the anther as Griffith shows in his figure and this seems from the description to be the only distinguishing character of *A. rubroluteum*.

*H. metriochilus* n. sp. *Achasma metriochelius* Griff. Notul. iii. 427. Ic. Pl. As. t. 356. *Amomum metriochilus* Bak. Ic. 234.

Stems tall and stout about 12 feet tall. Leaves oblong mucronate, glabrous above, softly velvety pubescent or glabrous beneath over 3 feet long and six inches wide, petiole stout 2 inches long or less, ligule oblong truncate one inch long. Spike about 2 inches long on a stout peduncle. Bracts ovate mucronate ribbed glabrous about an inch long red. Corolla tube 2 inches long pubescent within, lobes broad lanceolate crimson one inch long, longer than the stamen. Lip 2 inches longer than the corolla, linear emarginate, the sides rolled up over the stamen at the base, crimson with a yellow centre. Stamen filament very short, shorter than the anther, anther short and broad, almost square emarginate bent at an angle on the filament, deep rose colour. Style slender, stigma triangular.

Johor, Gunong Panti; Gunong Pulai. Perak, Maxwell's Hill. Selangor, Caves.

*H. macrochilus* n.sp. *Amomum macrochilus* Bak. Ic. 235. *Achasma macrochilus* Griff. Notulæ. iii. 429. Ic. Pl. t. 357.

Stem stout 12 feet tall. Leaves elliptic oblong cuspidate base rounded unequal, glabrous 15 inches long 4 inches wide, petiole half an inch long or less, ligule shorter ovate obtuse. Spike subcylindrical with rather thin lanceolate acute bracts, glabrous ribbed 2 inches long. Bracteoles narrow linear glabrous. Calyx tubular dilated upwards trifid, lobes acute  $1\frac{1}{2}$  inch long.

Corolla tube longer 2 inches in length lobes short broad blunt. Lip  $1\frac{1}{4}$  inch long, narrow linear apex deeply bifid, lobes narrow  $\frac{1}{4}$  inch long. Anther  $\frac{1}{4}$  inch long deeply emarginate.

Malacca at Ayer Panas (Griffith). Perak, Thaiping Hills (Curtis) (King 1897).

Apparently rare as I have not met with it. It is easily distinguished by its narrow lip deeply forked at the end. The flowers are entirely red according to Griffith.

Baker's *Amomum gomphochelus* (Flor. Brit. Ind. vol. p. 226) is based upon the plant numbered 1897 of King's collection but he says the tip of the lip is cuneate, while the plant I have received from Calcutta under this number is as described above and is clearly Griffith's *Achasma macrocheilus*.

## § 2. PHÆOMERIA Lindl.

*H. imperialis* Ridl. *Phæomeria imperialis* Lindl. Introd. Nat Syst. ed. 2,446. *Alpinia magnifica* Roscoe. Scitam. 75.

Stems about 13 feet tall one inch through. Leaves oblong acute green glabrous 2 feet long and 6 inches across, ligule ovate blunt nearly an inch long. Scapes about 3 feet tall partly covered with green sheaths, head cone-shaped elongating as the flowers open to 4 inches. Bracts lower ones oblong ovate 4 inches long and 2 inches across, spreading or recurved fleshy empty, upper ones linear oblong, all waxy pink with white edges. Bracteoles tubular spathaceous 3-lobed, short. Calyx  $\frac{1}{2}$  inch long deeply bifid lobes acute red. Corolla tube barely an inch long, lobes lorate thin obtuse pink. Lip longer narrow oblong obtuse, sides convolute, crimson with a white edge. Stamen filament linear flat white pubescent, anther oblong emarginate crimson splitting at the top. Style rather stout, stigma clubbed with a slit on the lower face. Stylodes short broad and thick, lobed. Fruits obconic green hairy, one inch through in a compact head, seeds numerous black enclosed in a translucent acid pulp.

Commonly cultivated under the name of Kantan, the spikes in bud being eaten as a curry stuff. This form may possibly not be native.

Johore, Kota Tinggi. Perak near the Waterfall, Thaiping.

Var. *speciosa*. *Elettaria speciosa*, Bl. Enum. I. p. 51. *A. elatior* Hook. Journ. Bot. I. p 359.

Margins of lip yellow.

Native of the Peninsula, Java and Sumatra. Selangor, Rawang. Perak, Tambun near Ipoh, Larut (King's Collector 3075).

*Elettaria anthodiooides* Teysm. is probably the same plant but appears to be rather smaller.

*H. fulgens* n. sp.

Rhizome stout and woody an inch through. Leafy stems about 15 feet tall and one inch through swollen at the base. Leaves oblong with a broad unequal base 2 feet long and 6 inches wide glabrous except the edge which is pubescent, dark green above tinted purple beneath when young, petiole an inch long, ligule covered with brown wool. Scape four feet tall, stout  $\frac{3}{4}$  inch through, covered with dark green sheaths rounded at the tip and mucronate below the tip, head about 3 inches tall 4 inches across. Bracts stiff coriaceous, lower ones broadly ovate with a stiff mucro 3 inches wide and long dull red outside, polished blood red within edges greenish white. Inner bracts (floral ones) linear oblong obtuse dull red edged whitish mucronate. Flowers about as long as bracts. Calyx spathaceous with three short acute points and three red ridges corresponding  $1\frac{1}{4}$  inch. Corolla lobes linear obtuse pink longer than calyx  $1\frac{1}{2}$  inch. Lip ovate obtuse deep red margin yellow  $\frac{1}{2}$  inch long, beyond the tube. Stamen shorter, anther red deeply notched  $\frac{1}{4}$  inch long. Stigma large style pubescent. Stylodes broad at the base lobulated above.

Perak, Larut hills.

This species differs from *H. imperialis* in its stouter and shorter scape broader and shorter head with stiff red ovate bracts, nearly entire calyx very shortly split, longer and broader corolla lobes, and larger stamen. In many respects it is intermediate between *H. imperialis* and *H. hemisphærica* (*Amomum hemisphæricum* Hook fil.).

*H. venusta* n. sp.

Stems ten feet tall  $1\frac{1}{2}$  inch through clubbed at the base,

above terete and smooth. Leaves oblong green over 2 feet long and 6 inches wide narrowed towards the base, ligule short rounded edge pubescent. Scapes 2 feet tall, peduncle  $\frac{1}{2}$  an inch through partly covered with mucronate pink sheaths the rest arachnoid. Head broad cup-shaped, base much broader than the peduncle, 3 inches long by 5 wide, outer bracts very broad oblong the tips recurved, appressed to the flowers 3 inches long  $2\frac{1}{4}$  wide rosy, somewhat fleshy, receptacle conic. Flower bracts linear oblong shorter than the flowers 2 inches long,  $\frac{1}{4}$  inch wide. Bracteole shorter spathaceous  $1\frac{1}{4}$  inch long split along the back whitish. Calyx  $1\frac{1}{2}$  inch long trifid split on one side deep red. Corolla lobes linear spatulate  $1\frac{1}{4}$  inch long obtuse red pink. Lip half an inch long thin oblong apex rounded blunt white the centre spotted pink. Stamen filament with white hairs, anther oblong inch long white cells covered with yellow hairs, emarginate. Style broad linear flattened above terete below. Stigma oblong flattened red. Fruit large conical beaked, glabrous red 3 inches long  $1\frac{1}{2}$  through at the base, ovules very numerous.

Selangor, Woods at Ginting Bidai.

One of the noblest species with the inflorescence in the form of a large broad-bottomed cup rose coloured and wax-like. The points of the erect outer bracts are turned downwards. The flowers are also rosy, and the fruit in a large round head waxy red with long projecting beaks.

*H. Maingayi* mihi. *Amomum Maingayi* Baker l.c. 235.

Rhizome long creeping throwing up leafy stems at some distance apart, shoots red roots strong and wiry. Stems about nine feet tall  $\frac{3}{4}$  inch through olivaceous green. Leaves oblong acute 18 to 24 inches long, 5 inches wide glabrous above, pubescent beneath, keel large rounded, petiole about  $\frac{1}{2}$  inch long apex rounded sheaths striate glabrous. Peduncle graceful but stiff, a foot tall, with pink sheaths with oval apices, head sub-globose  $1\frac{1}{2}$  inch long, outer. Bracts broad, with rounded edges, retuse mucronate appressed, pink entirely covered with silvery pubescence except the glabrous crimson margins. Inner bracts lanceolate over one inch long. Bracteole spathaceous tubular one inch long pubescent split on one side with three lanceolate muc-

ronate points. Flowers 2 inches long rose-colored. Calyx tubular with three lanceolate points longer than the corolla. Corolla lobes blunt oblong. Lip 3-lobed, laterals erect oblong, median lobe longer oblong dark rose colour. Stamen filament linear broad, anther bent at an obtuse angle more than  $\frac{1}{4}$  inch long deeply excavate dark crimson, pollen white. Style very slender, stigma reniform slit linear, not central, dark madder colour. Fruit obconic nearly glabrous half an inch long.

Singapore, Bukit Timah, Sungai Buluh. Pahang, Kota Glanggi. Selanger, Dusun Tua. Perak (Wray No. 3).

From the very short inadequate description, *Nicolaia pallida* Horan. from Java may be the same species. This plant is really intermediate between the two sections.

#### PLAGIOSTACHYS n. gen.

Stems usually very tall and stout with lanceolate leaves, pubescent. Flower spike thick borne on a peduncle covered with sheathing leaves and projecting from the side of the leafy stalk. Bracts oblong ovate laciniate. Flowers numerous small and fleshy. Calyx spathaceous short. Corolla tube short and thick, lobes oblong or ovate fleshy. Lip flat oblong. Stamen with a short thick filament an oblong anther, emarginate but with no crest. Staminodes two short subulate processes. Style rather short. Capsule ovoid conic or oblong, three-celled seed 3 or 4 in each cell, angled.

Malay peninsula and Borneo.

The type species of this curious genus I referred originally to *Amomum*, being unwilling to make a new genus of it, as long as the genus *Amomum* was understood as containing a heterogeneous mixture, but I am by no means certain now that the genus has not really more affinity with *Alpinia*. The peculiar position of the inflorescence is normally unique in the order. The fleshy simple flowers with a crestless anther are certainly more like those of some *Alpinia* than anything else, and Mr. Baker has referred *P. strobilifera* to that genus.

*P. strobilifera* n. sp. *Alpinia strobilifera* Bak. Kew Bulletin 1898. 235.

Stems about 2 feet tall fairly stout pubescent. Leaves lanceolate pubescent six inches long and three wide, sheath

tomentose, ligule very short pubescent. Spike lateral 3 inches long, rachis tomentose. Flowers numerous  $\frac{1}{2}$  an inch long, crowded, buds red, shortly stalked. Bracts brownish  $\frac{1}{4}$  inch long ovate hairy outside. Calyx cartilaginous tubular 3-lobed red. Corolla tube barely as long, thick, lobes oblong, upper one hooded, lower ones shorter red. Lip oblong bilobed apex orange base reddish orange. Anther large oblong retuse pubescent red.

British North Borneo, Bongaya River 1897; Sandakan (Creagh).

*Pl. lateralis* n.sp. *Amomum laterale* Rid. Trans. Linn. Soc. III. p 381.

A stout plant usually about six feet tall, with a thick underground rhizome. Leaves lanceolate acuminate pubescent  $2\frac{1}{2}$  feet long, 4 inches wide, dark green, petiole one inch long, ligule obtuse bilobed  $\frac{1}{4}$  inch long. Spike about six inches long protruded a foot or more above the ground from the side of the stem, sometimes branched, thick cylindrical, on a peduncle covered with ovate sheaths. Bracts oblong with laciniate edges. Calyx conic tubular as long as the corolla white. Corolla tube thick  $\frac{1}{4}$  inch long, lobes ovate acute dark red fleshy. Lip short obtuse flat emarginate, fleshy orange yellow, papillose. Stamen filament short thick pubescent, anther oblong pubescent white. Staminodes two short acute teeth. Styloides flesh colour oblong truncate, with a short blunt tooth. Capsule  $\frac{1}{2}$  an inch long, ovoid conic thin-walled, pale brown. Seeds 3 - 4 in each cell.

Singapore, Bukit Timah, Bukit Mandai, Reservoir Woods. Negri Sembilan, Perhentian Tinggi.

Another species I found in fruit on Gunong Panti in Johore was as large as the last species but had spikes six inches long and oblong fruit  $\frac{1}{2}$  an inch in length containing about 12 black angled seed very aromatic.

#### ELETTARIOPSIS.

This genus is most closely allied to Elettaria, and like it is almost peculiar in having the flower spikes borne on long creeping branches generally imbedded in mud, and rooting at intervals. The rhizome is slender and only slightly aromatic. The

leaves either solitary, *E. exserta*, *E. Curtisi*, or tufted, *E. serpentina*, or borne on an erect stem a foot or more tall. The flower spikes scattered along the creeping branches of the rhizome, are very short, only an inch or two long, and bear several flowers in the axils of dry short bracts. The calyx tube is usually long with three lobes, and the corolla tube long and graceful with narrow lobes. The lip is fairly large entire and rounded, usually white with a central yellow bar with red marks along it. The filament of the stamen is broad and short, the crest of the anther large and rounded, sometimes toothed. The style is slender, increasing above the anther, the stigma conical and rather large. The fruit, which is rarely to be met with, is in *E. longituba* a large round white capsule.

These plants are to be met with in damp woods often in great abundance, but seldom seen in flower.

#### SPECIES.

Leaf solitary.	Leaves few in a tuft.	Leaves on an erect stem.
1. <i>E. exserta</i> Bak.	3. <i>E. serpentina</i> Bak.	4. <i>E. latiflora</i> Ridl.
2. <i>E. Curtisi</i> Bak.		5. <i>E. pubescens</i> Ridl.
		6. <i>E. multiflora</i> Ridl.
		7. <i>E. longituba</i> Ridl.

*E. exserta* Baker l.c. 251. *Cyphostigma exserta* Scortechin. Nuov. Giorn. Bot. Ital. viii. 310 t. 13.

Rhizome slender, leaf usually solitary elliptic acute tapering into the petiole four to six feet tall including the petiole, the blade three feet long and one across. The scape erect with several scattered sheaths half an inch in length, bearing a single flower. Calyx tube slender three-lobed one inch long, corolla tube slender three inches long with lanceolate lobes  $\frac{3}{4}$  inch in length Lip oblong entire yellow with two red lines in the centre. Stamen with a short rounded crest, style longer than the crest, stigma cup-shaped.

Perak, Kinta (Scortechini).

The single gigantic leaf, and the erect scape with a single flower, distinguish this from all other species. I have never seen it.

*E. Curtisi* Bak. l.c. 252.

Rhizome far creeping, with woolly roots. Leaf solitary, blade a foot long and three inches wide lanceolate acuminate glabrous tapering below into the petiole, which is eight inches long and included in a long ribbed sheath. Flowering stems short three inches long. Bracts oblong lanceolate about half an inch long. Spikes scattered one or two flowered. Calyx spathaceous ampliate unequally three-lobed an inch long. Corolla tube 2 inches long, slender enlarged upwards, lobes oblong blunt white  $\frac{1}{2}$  an inch long and  $\frac{1}{4}$  wide. Lip obovate oblong median bar thickened  $\frac{3}{4}$  inch long. Stamen filament short rather broad, anther thick crest oval entire large. Style shorter than the crest, stigma cup-shaped large.

Penang Hill. Bukit Laksamana (Curtis 1705).

*E. serpentina* Bak. l.c. 252.

Rhizome as in *E. Curtisi*. Leaves three in a tuft unequal lanceolate acuminate narrowed into the petiole, glabrous, blade six to 8 inches long, two inches wide, petiole 4 inches long, glabrous. Flowering stems short two inches long covered with rather short oblong dry sheaths. Calyx tube one inch long, lobes linear  $\frac{1}{4}$  inch long. Corolla tube as long as the calyx rather thick, lobes oblong  $\frac{1}{2}$  an inch long, white. Lip oblong obovate cuneate apex rounded longer than the petals  $\frac{3}{4}$  inch long. Stamen filament broad and short, crest of anther very large oblong rounded. Style rather thick shorter than the crest, stigma large obconic with a very large slit.

Penang, 1000 to 1500 feet alt. May (King's Collector) Fls. white red brown and yellow in centre.

*E. latiflora* n. sp.

Rhizome far creeping  $\frac{1}{4}$  inch through almost covered with sheaths faintly aromatic, roots stout woolly. Leafy stems six inches to a foot tall with about five leaves blade lanceolate ovate lanceolate cuspidate dark green glabrous above pubescent beneath 10 to 13 inches long 2 to 4 inches wide, petiole rather slender 2 to 4 inches long base of the stem covered with long sheaths. Floral stems often numerous three or four inches to about six or even longer, spikes rather distant 2 flowered.

Bracts closely wrapping the flower pinkish  $\frac{1}{2}$  an inch long. Calyx  $1\frac{1}{2}$  inch long terete, the apex entire lanceolate split on one side red. Corolla tube three inches long slender white lobes oblong obtuse apices incurved  $\frac{3}{4}$  inch long nearly  $\frac{1}{4}$  inch wide yellowish white. Lip large obovate broad one inch long and as wide in the widest part, centre thickened yellow with a crimson bar on each side, tip yellow, the rest pure white. Stamnodes short ovate adnate to the filament  $\frac{1}{4}$  inch long. Stamen rather short and broad, anther cells diverging at the top; crest ovate thin toothed bent upwards at an obtuse angle to the filament. Style considerably longer than the anther but shorter than the crest, stout. Stigma obtuse with a short conical process behind the lip-like stigmatic surface.

Singapore in dense woods, Bukit Timah, Kranji, Sungai Buluh. Perak, Larut (King's Collector) 2886. Bujong Malacca.

*E. pubescens* n.sp. *Amomum elettariooides* Baker Fl. Brit. Ind. *Amomum* sp. Griffith Notulae Asiaticæ III. 417. *Elettaria* sp. Tab. CCCLII. 2.

Stems stout as much as half an inch through at the base about two feet tall, base covered with sheaths, above leafy. Leaves about 5 or 6 oblong lanceolate cuspidate softly thickly pubescent beneath above glabrous 6 to 8 inches long,  $1\frac{1}{2}$  to 2 inches wide, petiole  $\frac{1}{4}$  inch long, sheaths about three inches, ligule very short. Floral stems as much as two feet long, often much shorter usually numerous, rather slender. Spikes usually distant short one inch or less long bases covered with ovate scale-leaves. Bracts ovate lanceolate  $\frac{1}{2}$  an inch long pubescent ribbed edges ciliate. Flowers in pairs. Calyx slender enlarged upwards an inch long lobes linear acute, covered with long silky hairs, nearly or quite as long as the corolla tube. Corolla tube thick enlarged upwards pubescent with silky hairs, lobes narrow linear oblong obtuse  $\frac{1}{2}$  an inch long white. Lip about an inch long obtuse pubescent in the centre. Stamen filament broad, connective rather large three-lobed, central lobe largest. Style stout stigma cup-shaped.

Penang, Waterfall (Curtis 2276) Penara Bukit (Ridley 7236). Negri Sembilan, Foot of Bukit Tampin (J. Goodenough).

This grows in masses in thickets and waste ground often

near villages whence it is called Pua Kampong. It flowers in March and May. There can be little doubt that this is the *Amomum* of Griffith on which Baker's *A. elettarioides* was based. His description and drawing *Elettaria* sp. are fairly accurate. The three-lobed anther crest is not very clear however. There is a large rounded lobe at the back behind the stigma and the angle above the anther tips are somewhat drawn out. Jack's *Amomum biflorum* is probably the same thing though he says that the leaves are quite smooth except the midrib. He obtained it in Penang. The pubescent leaves and flowers and short corolla tube hardly longer than the calyx distinguish it from *E. latiflora* to which it is most nearly allied.

*E. longituba* Ridl. Trans. Linn. Soc. iii. 382.

Stem tall. Leaves oblong lanceolate cuspidate two feet long by two inches wide inequilateral at the base tapering into the petiole glabrous above, woolly pubescent beneath nerves very close, petiole one inch long, pubescent, ligule short pubescent. Flowering stems stout, becoming almost woody when fruiting and then  $\frac{1}{4}$  inch through, very long. Spikes numerous about half an inch apart. Sheathing leaves oblong cuspidate dark brown two inches long and nearly an inch wide. Flowers in pairs. Calyx tube two inches long slender enlarged above, tip ovate, three toothed. Corolla tube  $\frac{1}{4}$  inch longer than the calyx, lobes oblong obtuse rosy one inch long and  $\frac{1}{4}$  inch wide. Lip obovate crenulate  $1\frac{1}{4}$  inch long, white, with four pink lines in the middle, tip yellow. Stamen filament narrow pubescent crest 4 toothed. Stigma club-shaped, apex flat. Capsule globular white an inch through containing many triangular compressed black seeds.

Pahang, Tahan River (Ridley 2403). Selangor, Gunong Hitam. (Goodenough). Upper Perak at 300 feet elevation (Wray 3586).

The great size of the plant, and the large bracts, or rather sheathing leaves and long graceful calyx tube distinguish this remarkable plant. The leaves distributed with my plant No. 2403 I find really belong to it as Wray's plant has exactly similar ones. The Bukit Timah plant alluded to in the Trans. Linn. Soc. Ic, is a large form of *E. latiflora*.

*E. multiflora* n. sp.

Rhizome far creeping woody. Stems tall rather stout nearly half an inch through. Leaves numerous lanceolate cuspidate glabrous shortly petioled, one foot long two inches wide, ligule short rounded, sheath about three inches long. Flowering stems over two feet long slender, branched. Spikes secund very numerous and close together, sheathing leaves oblong cuspidate ribbed  $\frac{1}{2}$  inch long by  $\frac{1}{4}$  inch wide. Flowers five or six in a spike, rather small. Bracteoles lanceolate short. Calyx tube very slender one inch long, lobes equal oblong lanceolate cuspidate pubescent, points ciliate  $\frac{3}{8}$  inch long. Corolla tube as long as calyx lobes, lobes obovate spatulate  $\frac{3}{8}$  inch long more than  $\frac{1}{4}$  inch wide white. Lip entire obovate pubescent white with a central yellow bar and red markings  $\frac{1}{2}$  an inch long. Stamen filament broad, crest rounded rather small.

Sumatra on the Kelantan river near Siak (8972).

A very distinct species in its slender flower stems crowded with spikes each containing five or six small but pretty flowers only one or two of these however are out at once. I found it growing in a dense jungle swamp, the stems creeping through almost liquid mud, decaying leaves and water.

## GEOSTACHYS.

Rhizome stout woody, not subterranean, with stout roots. Leafy stems two or three feet tall with lanceolate cuspidate leaves, glabrous, petioled. Scapes lateral usually short decurved so as to lie on the ground (in one species erect). Flowers secund, two or three in a dry brown papery bract on a short peduncle, projecting but little from the involute bract. Calyx tubular spathaceous with an entire cuspidate limb, corolla tube shorter than the calyx, thick, lobes oblong as long as the tube, lip entire obovate as long as the corolla. Stamen with a short filament and linear anther with a small rounded crest or none, staminodes none.

This genus is closely allied to *Alpinia* with which it was doubtfully placed by Baker under the section *Geostachys* which I have reserved for its generic name. It differs in the flowers being borne not on the ends of the leafy stems, but in lateral leafless ones, also in the peculiar dry brown bracts which are

rolled round the flower, and the curious tubular calyx with an ovate limb ending in a long point. The rhizome usually very woody stands above the ground often supported on its roots for some height. The coloring of the flowers in all that I have seen alive is the same, buff yellow, more or less ornamented with red spots. The species *G. elegans* from Mount Ophir, is peculiar in having its inflorescence erect on a slender stem and not lying down upon the ground.

*G. decurvata* n. sp. *Alpinia decurvata* Bak. l.c. p. 257.

A large tufted plant with a stout rhizome. Stems stout 4 or 5 feet tall strongly ribbed when dry. Leaves lanceolate acuminate one foot and a half long and three inches across glabrous close-veined, petiole 2 inches long, ligule  $\frac{1}{2}$  an inch long oblong ovate truncate, sheath ribbed when dry. Scapes deflexed base suberect covered with numerous dry long sheaths 12 to 14 inches long, floriferous portion deflexed or horizontal, with about 20 secund flowers, pedicel  $\frac{1}{2}$  an inch long. Bracts at base  $\frac{1}{4}$  inch long lanceolate acute. Flowers in pairs included in brown boat-shaped mucronate sheaths one inch long. Calyx spathaceous as long as the corolla tube. Corolla tube not projecting beyond the bract, lobes lanceolate obtuse, half an inch long buff color. Lip one inch long obovate oblong apex rounded darker colored than the petals. Stamen with linear filament, anther linear with a small rounded petaloid crest. Capsule elongate glossy dark red.

Perak, Maxwell's Hill (Ridley 5189) (King's Collector 6310).

*G. secunda* n.sp. *Alpinia secunda* Bak. l.c. 257.

Stems stout and tall, leaves narrow lanceolate, over a foot long, one inch and a half wide, glabrous, petiole one inch long, ligule  $\frac{3}{4}$  inch long. Scapes deflexed six inches long base covered with large dry lanceolate acute sheath leaves 2 inches in length, pubescent, rachis and pedicels hispid. Flower spike numerous crowded secund, peduncles  $\frac{1}{2}$  inch long, flowers four in a spike. Bracts one inch long ovate lanceolate cuspidate pubescent. Calyx spathaceous with a long cusp  $\frac{1}{2}$  an inch long. Corolla tube shorter than calyx, lobes oblong lanceolate  $\frac{1}{2}$  an inch long. Lip oblong obtuse longer than the corolla lobes. Stamen fila-

ment short anther linear parallel, no crest. Style little longer.  
Perak (Scortechini 381).

*G. rupestris* n. sp.

Rhizome stout with very long pubescent roots. Leafy stems stout, leaves broadly lanceolate cuspidate glabrous 8 inches long by  $1\frac{1}{2}$  wide, ribs close elevated when dry, petiole short. Scapes about 3 inches long decurved, bases covered with large dry sheaths the uppermost lanceolate acute ribbed one inch long. Flowers secund pedicels glabrous  $\frac{1}{4}$  inch long solitary. Bract ovate one inch long. Calyx ampliate spathaceous ovate cuspidate pink  $\frac{1}{2}$  an inch long longer than the straight fairly slender corolla tube, corolla lobes oblong lanceolate  $\frac{1}{2}$  inch long. Lip obovate rounded longer than the corolla, yellow with red markings. Stamen filament short, anther narrow linear with a small rounded crest.

Kedah Peak 3-4000 feet. June 1893.

This much resembles *G. secunda* but differs in its broader leaves, short pedicels and solitary flowers, besides being much more glabrous. The flowers are dull yellow with red spots on the lateral petals and lip at the base.

*G. penangensis* n.sp.

Rhizome stout woody covered with dry sheaths, raised about an inch above ground. Stems usually numerous about three feet tall slender. Leaves narrowly lanceolate cuspidate glabrous about a foot long one to one and a half inches across very shortly petioled, ligule ovate obtuse  $\frac{1}{4}$  inch long. Panicles deflexed secund 3 inches long covered at the base by large brown papery sheathing bracts, rachis glabrous peduncles  $\frac{1}{4}$  inch long pink. Outer bracts slightly pubescent  $\frac{1}{4}$  inch long brown spathaceous enclosing a pair of flowers. Calyx spathaceous cuspidate one inch long. Corolla tube shorter red rather thick lobes subequal oblong obtuse  $\frac{1}{2}$  an inch long. Lip nearly an inch long and half an inch wide, three-lobed lobes short rounded, median lobe obovate rounded ocreous yellow minutely pubescent. Stamen longer than the lateral lobes of the lip, anther  $\frac{1}{4}$  inch oblong with no crest. Style barely longer very slender. Stylodes yellow lanceolate conic, rather large:

Penang. Common on dry banks at 2000 feet alt. (Curtis 327). It flowers in June and July.

This is most nearly allied to *G. rupestris*, but has much narrower leaves and smaller flowers, and there is no trace of a crest on the anther.

*G. elegans* n. sp.

Rhizome stout and woody covered with dry brown sheaths, with very stout firm roots. Stems about 3 feet tall bases covered with brown sheaths, leaves narrow lanceolate acuminate about a foot long, and one inch broad glabrous, petiole  $\frac{1}{4}$  inch long, ligule ovate obtuse  $\frac{1}{8}$  inch long. Scapes erect  $1\frac{1}{2}$  feet tall, the lower part covered with dry brown sheaths, lowest ones about 2 inches long obtuse, upper ones acute. Rachis pubescent. Panicle 5 or 6 inches long with very short peduncles each bearing two flowers enclosed in an ovate bract, outer bracts ovate mucronate pubescent brown  $\frac{1}{2}$  an inch long. Calyx spathaceous brown acuminate longer than the corolla tube. Corolla half an inch long tube short, lobes oblong obtuse, buff. Lip obovate oblong retuse little longer than the petals. Stamen filament very short, anther oblong narrow, notched  $\frac{3}{16}$  inch long, crest none. Style slender, stigma cup-shaped. Capsule orange globose  $\frac{3}{8}$  inch long glabrous crowned with the dry calyx. Seeds angled.

Malacca on Mount Ophir. (Derry 603; Ridley 3137) Common up to 4000 feet elevation. A very distinct species with tall rather slender scapes, and smaller flowers than any other species. It grows in large tufts on rocks, and in the woods.

ALPINIA.

This is a fairly well marked genus, distinct in bearing the flowers in terminal panicles or racemes on tall leafy stems, the flowers numerous often large and showy, the corolla tube usually barely longer than the tubular calyx, the lobes linear or oblong, the lip large obovate rolled round the stamen, (*Catimbium*) or small narrow lobed, (*Hellenia*) staminodes sometimes absent, or horn-like subulate processes rarely broad and spatulate. The stamen long, fleshy, the anther thick, crest absent (*Catimbium*) or well developed (*Cenolophon*). The fruit a globose or cylind-

ric capsule, orange colored, green, or brown, black dry dehiscent pubescent or hairy seeds numerous angled small enclosed in a sweet pithy aril, aromatic.

The genus is confined to East India, China, and North Australia. Many species are cultivated for their beautiful flowers, some especially *A. Galanga* and *A. officinalis*, the Galangals for their aromatic rhizomes. The species have been arranged in four sections, viz., *Ethanum*, with the buds not enclosed in large bracteoles, and no anther crest, *Catimbium* with large bracteoles, and no crest, *Hellenia* with a small anther crest and *Geostachys* which I would exclude as a distinct genus. This grouping is not however quite satisfactory as it separates closely allied plants, while placing very different species together. Nearly all fall readily into three groups which indeed might be called genera, viz.,

(A). *Hellenia*. Flowers small, white or pink, lip narrow not convolute often bifid. Anther usually crested. Fruit small globose few-seeded.

(B). *Catimbium*. Flowers large, lip broad obovate convolute, red and yellow. Anther not crested, fruit globose, large, seeds small numerous.

(C). *Cenolophon*. Flowers large, lip entire oblong orange anther crested. Fruit usually cylindric or fusiform, seeds large few.

#### *Hellenia.*

Lip entire obovate.	<i>A. conchigera</i> .
Lip „ narrow oblong.	<i>A. secundiflora</i> .
Lip bifid, spatulate	<i>A. Gaianga</i> .
„ lobes narrow, linear, no anther crest.	<i>A. melanocarpa</i> .
„ „ „ „ anther crested.	<i>A. scabra</i> .
„ four-lobed	<i>A. rosella</i> .

#### *Catimbium.*

Panicle or raceme lax, bracts oblong or boat-shaped.	
Staminodes absent, bracteoles small caducous.	<i>A. mutica</i> .
„ bracteoles large boat-shaped.	<i>A. assimilis</i> .

Staminodes subulate glabrous, corolla orange. *A. Rafflesiana*.  
 " " white  
 " " lip broader than long *A. nobillima*.  
 Staminodes short blunt hairy. Lip longer than broad  
*A. latilabris*.

*Cenolophon.*

Raceme lax nodding flowers large *A. petiolata*,  
 Raceme erect, dense flowers smaller.  
 Leaves base unequally cordate *A. macrostaphanum*.  
 base narrowed, blade lanceolate *A. vitellina*.  
 " blade ovate broad *A. cannaefolia*.  
 Aberrant plant, with cap-shaped bracts, and spathulate staminodes *A. comosa*.

*Alp. Alhugas* Rosc. *A. calcarata* Rosc. *A. bracteata* Roxb. and *A. nutans* Rosc. are all mentioned as occurring in the Malay peninsula by Mr. Baker but without any locality or collector's name. I have not seen specimens wild or even cultivated of any except the last, which was formerly cultivated in a few gardens.

*A. conchigera* Griff. Notul iii. 424, Ic. Pl. Ast 354.

A dwarf plant about two feet tall, with an aromatic rhizome. Stems slender 6 feet tall pale green. Leaves oblong glabrous obtuse with a very short point light green, edges ciliate, one foot long about 3 inches wide, petiole broad  $\frac{1}{2}$  an inch long, ligule thin short rounded pubescent. Panicle erect about a foot long, branches short. Calyx short thick rounded, teeth 3 triangular obtuse equal and regular  $\frac{3}{16}$  inch long. Corolla tube very short, lobes white oblong elliptic blunt, hooded  $\frac{1}{4}$  inch long wide much shorter than the stamen. Lip obovate with two short teeth at the base triangular acute sides turned up, yellowish white with 4 red streaks on each side. In the centre at the base is a retuse callus edged with pink and a red spot on each side. Stamen yellow curved, as long as the lip, anther short elliptic, cells divergent at the tip and converging below;  $\frac{1}{4}$  an inch long. Style projecting beyond the anther, stigma cup-shaped. Capsule globose red.

In damp open spots. Malacca, at Umbai; Chenana putih. Province Wellesley, Kubang Semang; (Curtis). Johore, Kwala

Sembrong (Kelsall) Perak, Kwala Kangsa. Pahang, Rumpin river. Also Chittagong.

The Lankwas Ranting of the Malays.

*A. melanocarpa* n. sp.

*Hellenia melanocarpa* Teysm and Binn. Pl. Hort. Bogor. cult. p. 328.

Stems tufted two to six feet tall from a stout rhizome. Leaves lanceolate acuminate narrowed at the base about six inches long and two inches wide glabrous, petiole half an inch long, ligule as long entire. Panicle about six inches long, with short branches  $\frac{1}{4}$  inch long usually 3-flowered. Bracts very small lanceolate cuspidate pink. Calyx tubular nearly  $\frac{1}{2}$  inch long white. Corolla tube little longer, lobes oblong obtuse, white. Lip with a narrow base then dilated and bifid, lobes blunt, pink. Staminodes two small green teeth at base of stamen. Filament linear flat, anther oblong fleshy retuse with no crest. Style but little longer stigma cup-shaped. Capsule small globose black, or red.

Singapore. Kranji, Selitar, etc. Pahang at Kwala Pahang.

This is I think Teysmann's *Hellenia melanocarpa* which was obtained from Sumatra. It has much the habit of *A. conchigera* Griff. but can be distinguished by its pink bifid lip.

*A. Galanga* Sw. Obs. Bot. 8. *A. viridiflora* Griff. Notul. iii 423.

Maranta Galanga. L. Sp. pl. 2.

A tall plant about 6 or 7 feet tall with numerous stout stems, Leaves lanceolate acute very finely striate dark green above lighter beneath with a thin white edge, 18 inches long  $3\frac{1}{4}$  broad with a short petiole  $\frac{1}{4}$  inch long, sheath striate deeply split, ligule entire rounded  $\frac{1}{4}$  inch long. Bracts lanceolate acute  $\frac{1}{2}$  an inch long. Panicle compact six inches or more long. Flowers numerous sweet-scented. Pedicels  $\frac{1}{4}$  inch long finely pubescent. Calyx tubular very unequally trifid,  $\frac{1}{2}$  an inch long, lobes ovate, white. Corolla tube no longer than the calyx, lobes recurved fleshy linear, apex cucullate,  $\frac{3}{4}$  inch long green. Lip one inch long porrect, spatulate, claw narrow light green fleshy with two low ribs and a groove between, limb bifid white with red streaks on each side, sides curved up. Staminodes two short pointed

processes at the base pink. Stamen about an inch long filament broadly linear white, anther notched at the apex, bent at an angle with the filament, cells linear, fleshy, thick. Style very slender fusiform, stigma rounded. Stylopodium ovoid blunt small. Fruit small  $\frac{1}{4}$  inch long elliptic red with one or two rounded seeds only.

Commonly cultivated and long persisting after the ground is abandoned. This, the "Lankwas" of the Malays, whence its name Galanga, does not seem to be known in a wild state anywhere.

*A. Zingiberina* Bak. (Bot. Mag. t. 6944) the Siam ginger, much resembles this but is distinct in the form of the lip which has no distinct claw, but is obovate and notched all round the edge, and much less deeply bilobed.

*A. scabra*. Benth Gen. Plant. iii 648. Bak. Ic. 256. *Hellenia scabra* Bl. Enum. 60.

A tall plant with stems about six feet tall. Leaves lanceolate cuspidate a foot and a half long and two inches broad dark green (drying pale greenish) scabrid on the upper surface, petiole winged to the base  $\frac{1}{4}$  inch long, ligule oblong truncate  $\frac{1}{4}$  inch long. Panicle upwards of two feet long, upper branches short two or three lower ones usually six inches long. Flowers rather small on pedicels nearly  $\frac{1}{4}$  inch long ebracteate, white. Calyx campanulate  $\frac{1}{4}$  inch long, with three teeth. Corolla tube longer rather slender curved, lobes lanceolate oblong obtuse,  $\frac{1}{4}$  inch long, dorsal one-hooded, white. Lip narrow shorter than the petals, deeply bifid lobes linear oblong. Stamen long filament linear slender, anther cells slightly divaricate, crest very short. Capsule globose smooth  $\frac{1}{3}$  inch through.

This plant grows in woods on the hills at about 1000 feet altitude. Its general appearance is that of *A. galanga*. The leaves are only scabrid when dry.

Johore, Gunong Pulai. Selangor, Bukit Hitam. (Kelsall). Perak, Thaiping hills; Bujong Malacca. Kedah, Kedah Peak.

*A. rosella* n.sp.

A small tufted plant stems about 2 feet tall rather slender. Leaves lanceolate acuminate with a long point glabrous rather

stiff 8 inches long and one wide or less, petiole nearly  $\frac{1}{4}$  inch long, ligule as long. Panicle absent 4 inches long, with a few short branches at the base, flowers in threes on short peduncles, small rosy. Calyx campanulate  $\frac{1}{2}$  inch long lobes very obscure. Corolla tube longer dilated upwards, lobes short ovate oblong rounded. Lip 4 lobed with a short narrow claw two erect rounded oblong lobes and the median one divided into two narrow linear oblong obtuse lobes. Stamen considerably longer  $\frac{1}{4}$  inch long, anther linear oblong with a small rounded lanceolate crest. Capsule globular black. Seeds 3 about inch through black, outer face rounded, inner one angled.

Borneo, Kudat (1897) Brunei Bay (Bishop Hose).

Allied to *A. melanocarpa* but differing in the very small flowers only  $\frac{1}{2}$  an inch long, the short calyx rounded broad corolla lobes four-lobed lip and crested stamen.

*A. secundiflora* n.sp.

Leaves lanceolate acute one foot and a half long, 2 inches across glabrous, grey above when dry and glaucous beneath, petiole winged  $\frac{1}{2}$  an inch long, sheath transversely wrinkled, ligule  $\frac{1}{4}$  inch long obtuse. Panicle nearly a foot long, with a peduncle over six inches long, bearing several lanceolate sheathing bracts wrinkled transversely, the largest six inches long, branches pubescent short  $\frac{1}{2}$  an inch long, flowers numerous secund. Bracts small ovate  $\frac{1}{2}$  inch long. Calyx tubular one inch long, lobes 3 sub-equal ovate, apices mucronate pubescent. Corolla tube  $1\frac{1}{2}$  inch long narrow funnel-shaped, lobes oblong hooded, Lip shorter than the corolla lobes oblong obtuse rounded with three strong veins. Staminodes flat wing-shaped ending in a linear subulate point inch long. Stamen filament broad, anther oblong not crested. Style slender, stigma cup-shaped.

Selangor. Bukit Hitam (H. J. Kelsall).

A dried specimen of this plant was brought by Lieut. Kelsall from Bukit Hitam some years ago, and it has never been collected since, either there or elsewhere. The tall panicle with narrow flowers all turned to one side of the rachis is peculiar.

*A. mutica* Roxb. Fl. Ind. i. 67. Roscoe Scit. Pl. t. 69.

From 3 to 6 feet tall usually rather slender. Leaves narrow lanceolate very acuminate tapering at both ends glabrous light

green, 18 inches long, and 2 inches across, petiole rather slender one inch long, ligule ovoid blunt  $\frac{1}{4}$  inch long, brownish. Panicle short or long, 3 to many flowered, with several short branches rachis finely pubescent, sometimes nearly glabrous. A long linear green leaf-like bract encloses the whole inflorescence in bud. Bracteoles very small about  $\frac{1}{4}$  inch long oblong white, very soon falling, the one in the uppermost flower often large enclosing the bud. Flowers in threes, pedicel  $\frac{1}{4}$  inch long, as long as the pubescent ovary. Calyx narrowed at the base suddenly dilate above split about  $\frac{1}{2}$  way down, three toothed  $\frac{1}{2}$  inch long white. Corolla tube shorter lobes oblong about an inch long, white upper one oblong ovate lip indistinctly three-lobed, sides turned up, apex truncate crisped, orange with numerous red dots and veins, a raised dark red glabrous swelling at the base on each side. Stamen filament rather short channelled, anther buff,  $\frac{3}{4}$  inch long, thick, apices of cells a little diverging. Stigma cup-shaped. Capsule globose orange-red, very minutely downy, splitting readily in three. Seeds numerous black or dark gray with a sweet white aril, aromatic.

Pulau Aor, and Pulau Dayong (Islands off the East Coast of Johore). (Feilding.)

This plant I have not met with in any part of the peninsula but it has long been cultivated in the Singapore Gardens where it grows very readily. There are two forms, one of which is short, with very narrow leaves, and panicles of two or three flowers, and another much stouter with broad leaves, a larger panicle and almost glabrous fruit. The former is the plant figured by Roscoe, the latter is the form collected by Mr Feilding and is the variety figured by Roxburgh. There is no trace of any staminodes. I found a monstrous flower on one plant with two complete polliniferous stamens, and between them a short linear subulate process, in which apparently the normally developed stamen was rudimentary and the two lateral ones developed. This may be compared with Roscoe's *A. difissa* which is probably a specimen of this plant with all the flowers like this.

*A. assimilis* n.sp. *A. mutica* Hook. fil. Bot. Mag. t. 6908 (not Roxburgh).

About 6 feet tall. Leaves lanceolate acuminate narrow  $1\frac{1}{2}$

foot long,  $1\frac{1}{2}$  inch broad glabrous dark green petiole 1 inch long, ligule  $\frac{1}{4}$  inch long oblong blunt. Raceme 6 inches to a foot long rachis pubescent, branches few and short. Flowers rather distant. Bracteoles ovate white an inch long, calyx  $\frac{3}{4}$  inch long enlarged upwards, 3 lobed, lobes short, white, corolla tube short  $\frac{1}{4}$  inch long, lobes white upper one obovate obtuse one inch long,  $\frac{3}{4}$  inch wide lower ones smaller, lip obovate obscurely three lobed 2 inches long,  $1\frac{1}{2}$  wide, median lobe rather short crisped orange thickly spotted with red and red veined; a pair of short thick conic fleshy processes thickly pubescent at the base. Stamen filament broadly linear, anther oblong  $\frac{1}{2}$  an inch long. Stigma capitate, slit transverse, ovary very pubescent. Capsule globose hispid orange. Seeds black angular.

River banks and damp spots. Johore, Kota Tiuggi. Pahang, Pekan. Penang, Batu Feringgi (Curtis 2766) : Province Wellesley Ara Kudah. Pulau Burn (Island South of Singapore).

This is easily distinguished from *A. mutica* with which it has been confused by the large white bracteoles covering the buds, and the glandular processes at the base of the lip which are distinctly elevated and often of some size and covered especially on the back with stiff silky hairs. The coloring of the flowers and habit of the two plants are quite similar.

*Var. sericea.*

Leaves lanceolate tapering at the base, broader and cuspidate at the apex, scantily pubescent above softly velvety beneath 13 inches long, 3 inches wide, petiole one inch long, ligule very short. Raceme a foot long, rachis silky pubescent, flowers numerous crowded, pedicels inch long silky pubescent. Bracteoles large ovate one inch long and as wide ribbed pubescent, persistent. Calyx short and broad spathaceous 3 lobed, lobes cuspidate, pubescent. Corolla tube very short and stout, lobes oblong silky  $\frac{1}{2}$  an inch long blunt. Lip obovate obscurely trilobed an inch long, yellow veined and dotted red apex rounded bilobed, glands at base elevated pubescent.

Cult. in Buitenzorg Gardens (No. 3.)

This plant closely resembles *A. assimilis* but differs in its pubescent velvety leaves, and very short silky calyx and corolla, the bracteole being considerably longer than the calyx which

again is longer than the corolla. It should probably be classed specifically distinct, but for the present I prefer to leave it as a variety of *A. assimilis*.

*A. glabra* n.sp.

Stem unknown. Leaves lanceolate acute, tapering at base, closely ribbed rather stiff and glabrous,  $1\frac{1}{2}$  foot long 3 inches wide petiole 2 to 3 inches finely ribbed, ligule bilobed rounded  $\frac{1}{4}$  inch long. Panicle shorter than the leaves erect lax, lower branches about 3 inches long, glabrous. Bracteoles caducous. Flowers in pairs. Calyx gradually dilated upward,  $\frac{3}{4}$  inch long, lobes short broad truncate pubescent. Corolla tube slender as long as the calyx, lobes linear obtuse hooded  $\frac{1}{2}$  an inch long. Lip oblong boat shaped, apex bifid lobes short blunt,  $1\frac{1}{4}$  inch long. Staminodes short rather thick tapering upwards. Stamen  $\frac{3}{4}$  inch long glabrous, filament rather narrow, crest ovate obtuse quite entire ovary small sub-globose glabrous.

Borneo, Santubong in Sarawak (Dr. Haviland).

This is very distinct from all the others of this section in its lax panicle with stiff spreading branches, the boat-shaped lip and the oval entire crest. The leaves too are much stiffer in texture and the whole plant is almost completely glabrous.

*A. malaccensis* Roxb. Trans. Soc. Lit. n. VIII 345. is an unfortunately named species. It does not occur here so far as I know but is a native of India. The Javanese and Moluccas plants described as of this species are not *A. malaccensis* but perhaps one of the next two described.

*A. latilabris* n.sp.

Whole plant about 12 feet tall. Leaves glabrous, except the midrib, petiole and ligule, 2 feet and a half long, 3 inches wide narrowly lanceolate tapering at the base, petiole an inch long, ligule sub-acute brown pubescent. Raceme sub-erect, many flowered 6 inches long, rachis stout pubescent very pale green, outer bracts oblong lanceolate blunt 2 inches long 1 inch wide, white tinted with rose, Inner bract ampliate trifid at the apex  $1\frac{1}{2}$  inch long, pinkish white. Pedicels very short white pubescent  $\frac{1}{4}$  inch long, ovary longer, pubescent. Calyx trifid at apex narrowed at base dilate above white tipped with rose. Corolla

tube as long as calyx, lobes very unequal, upper one oblong obtuse  $1\frac{1}{2}$  inch long by  $\frac{3}{4}$  inch wide, lateral ones much narrower adnate to lip. Lip  $1\frac{3}{4}$  inch long and nearly 2 inches across, cor-date, lobes not distinct apex narrowed shortly bifid lobes spreading acute; orange densely spotted with red, central bar and veins at apex deep red edge yellow. Staminodes curved crimson with a dark spot at base, shaped like the horns of an ox  $\frac{1}{4}$  inch long. Stamen filament broad linear as long as the anther grooved white, base pink, anther  $\frac{3}{4}$  inch long. Fruit globose, orange nearly glabrous.

Pahang, Pulau Datu, on river banks.

This is distinguished from *A. nobilis* by its nearly glabrous leaves smaller panicle and bracts, while the tip though resembling that of *nobilis* in form has much shorter terminal lobes. The fruit too is very different. It has long been cultivated in the Botanic Gardens and from cultivated specimens I take the description. The Pahang plant seems to be the same thing.

*A. nobilis* n. sp.

Stems about 6 feet tall and one inch through pubescent. Leaves oblong cuspidate base oblique 2 feet long, 6 inches wide dark green glabrous above velvety pubescent beneath, petiole stout one inch long brown velvety, ligule inch long bilobed lobes truncate. Raceme about a foot long enclosed in two very large sheath. Bract very large three lobed, lobes nearly separate white tipped carmine, 2 inches long and three across. Calyx one inch long spathaceous white 2 or 3-fid dilated upwards, pubescent. Corolla tube shorter than the calyx lobes oblong obtuse  $1\frac{1}{2}$  inch long one inch wide white silkily hairy especially along the edge. Lip very large  $2\frac{1}{2}$  inch long and 2 inches wide cor-date bilobed lobes large oblong obtuse truncate strongly crisped, median bar of lip thickened with four obscure grooves, lateral lobes and disc of lip blood red with yellowish white spots in lines, apex lemon yellow with the nerves elevated crimson. A strong erect hairy keel runs vertically from the disc parallel to the stamen on either side, where are pustular elevations and in some flowers a horn-like spur. Stamen filament half an inch long broad flat pubescent anther very thick as long lobes divariccate at apex, cells brownish. Style longer recurved stigma cup-

shaped. Capsule round flattened at both ends orange stiffly hairy. Seeds numerous. Cultivated in the Botanic gardens 1888-1898 fl. November.

Pahang, Kwala Tembeling. Selangor, Ginting Bidai.

This superb plant has long been cultivated in the Botanic Gardens, but whence it was obtained is quite uncertain. It is the largest species known to me, and very distinct in its large white triple bracts tipped with pink, and its deep blood-red lip very broad and ending in two oblong undulated lobes. The leaves are remarkably velvety beneath.

*A. Rafflesiana* Wall. Cat. 6575. Baker l.c. 255.

Stems about 4 feet tall slender, leaves lanceolate cuspidate pubescent, 12 inches long by three wide, petiole  $\frac{1}{2}$  an inch long, ligule oblong sheaths pubescent. Panicle short and compact, 2 to 4 inches long. Bracts oblong short. Calyx short, dilated upwards, mouth oblique red. Corolla tube nearly twice as long, lobes broadly lanceolate orange tipped red  $1\frac{1}{2}$  inch long. Lip longer, broadly ovate sides upcurved, orange with darker veins. Staminodes two short deep maroon toothed processes. Stigma filament linear fleshy, anther oblong retuse. Style longer than stamen, stigma rounded. Capsule globose green  $\frac{3}{4}$  inch long pubescent.

Singapore, Sungei Buluh; Changi; Tuas. Johore, Tanjong Bunga; Gunong Panti; Ulu Batu Pahat. Malacca, Sungei Hudang. Selangor, Bukit Hitam; Bukit Kutu. Perak, Dindings, Telok Sera; Maxwell's hill, Gunong Keledang.

This pretty plant easily distinguished by its short panicle of entirely orange colored flowers, occurs all over the peninsula from Singapore to Perak, inhabiting woods up to an attitude of 4000 feet. It is called Pua Munkang, and Tepus Kijoi. This plant commonly known as *Alpinia vittata* of Gardens, is quite different from this, which I believe is not in cultivation at all.

*A. comosa* n. sp.

Stems slender 6 to 10 feet tall, slender terete dark green. Leaves narrow lanceolate acuminate with long points edges serrate with short stiff hairs at the apex, about a foot long and

1½ to 2 inches across deep polished green, petiole none, ligule very short rounded. Raceme terminal erect standing at right angles to the stem about 6 inches long dense, rachis pubescent. Bracts conical cup-shaped acute white, falling off before the flower opens. Flowers numerous medium size on pedicels long. Calyx spathaceous white  $\frac{1}{2}$  an inch long. Corolla tube, infundibuliform white, a little longer, lobes oblong pubescent  $\frac{1}{2}$  inch long, nearly  $\frac{1}{4}$  inch wide at the base obtuse, upper one hooded, white. Lip about  $\frac{3}{4}$  inch long with broad upturned sides and a narrow deflexed apex minutely bifid rather stiff pubescent median bar thickened fleshy polished, white with a pale yellow base, a bar of deep crimson dots at the base on each side. Staminodes, inch long spatulate with a broad rounded apex rather stiff white with a patch of deep crimson dots. Stamen filament linear  $\frac{1}{2}$  inch long white. Anther  $\frac{1}{4}$  inch long white a small but distinct oblong rounded crest longer than the stigma pubescent, stigma capitate green. Capsule cylindric 2 inches long  $\frac{1}{2}$  inch thick strongly ribbed, brownish ochre colored.

Kedah Peak in forests; cultivated in the Botanic Gardens it flowers in March.

This is a most aberrant plant. The bracts in the form of tall conical caps falling off as the flowers open, the large broad flat staminodes and the very curious long narrow fruit make it quite unique. It is very difficult to compare it with any other species, but it should probably belong to the *Hellenia* section.

*A. involucrata*. Griff. Notul. iii. 422. *Costus malaccensis* Koen. Retz. Observ. iii. 71.

Stems about six feet tall and half an inch through. Leaves oblong acuminate cuspidate 18 inches long by six inches wide glabrous above and softly pubescent below, petiole 1½ inch long purple brown pubescent, ligule bifid to the base lobes oblong truncate with hairy edges. Panicle pendulous short. Bracts oblong white at first but brown and withered before the flowers open. Floral bracts cup-shaped white  $\frac{1}{2}$  an inch long, encircling two or three flowers. Calyx tubular dilated upwards  $\frac{3}{4}$  inch long, glabrous with three short bosses representing the divisions. Corolla tube thick, upper lobe oblong prolonged to a blunt point, 1½ inch long, lateral lobes shorter, oblong blunt all white pubes-

cent at the base and hooded at the apex, with a scarious margin. Lip ovate broad trumpet-shaped margins denticulate otherwise entire (rarely obscurely lobed) 2 inches long,  $1\frac{1}{2}$  broad orange with crimson spots and veins at the base, edge white. Staminodes irregular short with two or three points crimson. Stamen filament  $\frac{3}{4}$  inch long pubescent, anther very thick,  $\frac{1}{2}$  an inch long pubescent, apices of cells separate, no crest, cells linear narrow. Style abruptly recurved at the apex, ovary silky. Capsule globose green. Shady woods and banks.

Johore, Gunong Panti. Malacca very common. Muar (Feilding). Selangor very common especially near Kwala Lumpur. Perak, Larut, Ipoh, (King 2296) Waterloo. Also at Sungai Kalantan, Siak in Sumatra.

Though Baker classes this as near *A. nutans*, Roxb, it is very different in many points. The curious cup-like bracts round the flowers, the hooded petals, the thick nearly cordate anther, and short compact panicle make it quite peculiar. The flowers are fertilized by a brown humble bee, and seldom fail to produce fruit, which is always green, never becoming orange as in other species. It is called Poko Girgin, and Kantan hutan by the Malays. A variety occurs in the Kinta valley at Ipoh and Bujong Malacca in which the flowers are colored as in *A. capitellata* with the calyx, tips of corolla and centre of lip red.

*A. capitellata* Jack Hook. Journ. Bot. i, p. 360.

Stems over six feet tall or more one inch through purplish brown pubescent. Leaves oblong cuspidate edges pubescent 2 feet long, 4 inches wide, petiole 3 inches long or less pubescent ligule large and hairy. Inflorescence a nodding obconic head 4 inches across, with very large ovate cuspidate thin bracts the lower ones three inches long and wide. Bracteoles short rounded cup-shaped, much shorter than the bracts. Flowers almost sessile hardly protruding. Calyx  $\frac{1}{2}$  an inch long, much dilated upwards with the base wider than the pubescent yellow, ovary ( $\frac{1}{4}$  inch long) obscurely three-lobed, the lobes rounded red. Corolla tube a little longer than the calyx lobes stiff, upper one an inch long and  $\frac{3}{4}$  inch wide hooded with a stout blunt mucro which with the centre is red, the rest white lateral lobes obovate blunt the apex in the centre raised to a

boss red. Lip obovate with a bifid apex, sides convolute, edges crisped  $1\frac{1}{2}$  inch long by 2 wide, edge white, centre orange, thickly dotted with dark red, dots in lines. Staminodes adnate to the edges of the lip and to the base of the filament, short subacute deep brown pink shining. Stamen 1 inch long filament  $\frac{1}{8}$  inch wide glabrous yellowish, anther deeply emarginate pubescent yellow with pink dots on the back. Style as long as stamen, apex decurved, stigma sub-triangular with a linear slit. Capsule globose minutely pubescent green.

Woods, Province Wellesley, at Ara Kudah; Dindings, Gu-nong Tungul. A fine plant closely allied to *A. involucrata* but quite unique in its large obconic capitula of flowers, with very large bracts at the base.

Jack's description as far as it goes fits this plant very well, but it is not very complete. He obtained his plant at Bencoolen in Sumatra.

§ *Cenolophon.*

*A. vitellina* n. sp. *Cenolophon vitellinum* Horan. Prodr. 36. *Amomum vite.linum* Lindl. Journ. Hort. Soc. ii. 245. Bot. Reg. 1847, t. 52.

Rhizome stout branched. Stems numerous 3 to  $3\frac{1}{2}$  feet tall  $\frac{1}{2}$  an inch through dull green flattened and ribbed. Leaves lanceolate acuminate 10 inches long 3 inches across, dark green, petiole less than  $\frac{1}{2}$  an inch long ligule rounded usually split  $\frac{1}{2}$  an inch long edged with rufous fur, sheath deeply split. Panicle terminal with few branches much shorter than the leaves compact, about 4 inches long, rachis pubescent. Bracts narrow linear caducous 3 inches long green. Flowers sessile or nearly so. Calyx tubular green one inch long pubescent trifid split. Corolla tube as long as the calyx, yellow, lobes linear blunt erect, yellow one inch long, posticus one hooded. Lip longer than corolla flat oblong cuneate bifid at apex edges crispid, orange veined with darker color, and sprinkled with red dots, stamen filament shorter than lip flat pale orange. Crest very large three-lobed toothed. Staminodes two short red horn-like processes.

Penang Hill. Selangor, Dusun Tua.

This species was first described from a plant sent to Chiswick

Gardens, and stated to have come from Ceylon, which was evidently an error. It has been referred to *Amomum*; and to a new genus *Cenolophon* apparently on account of the well developed anther crest. It is however in every other respect a typical *Alpinia*. The lip being not rolled up as in most of this genus so as to enclose the stamen, the anther crest is strongly developed so as to direct the fertilizing insect to the nectary.

A specimen labelled *A. Wrayi* from Dr. King evidently belongs to this species, but the description in the *Flor Brit. India* does not at all agree with *A. vitellinum*, *A. Wrayi* being classed with the crestless Alpinias and compared to *A. calcarata*. I have therefore retained the highly appropriate specific name given by Lindley.

*A. cannaefolia* n. sp.

Stem stout 4 or 5 feet tall. Leaves ovate or oblong ovate narrowed at the base, apex broad cuspidate, glabrous one foot long, 6 inches wide, petiole 4 inches long. Raceme erect about 6 inches long, peduncle a foot or less, pubescent. Bracts linear, lowest one as much as a foot long,  $\frac{1}{4}$  inch broad green, persistent. Flowers numerous pedicels very short pubescent inch. Bracteoles very small. Calyx dilate trilobed, pubescent  $\frac{1}{2}$  inch long, lobes blunt tipped with hairs. Corolla tube slender, as long, lobes linear one inch long, blunt. Lip more than an inch and a half long oblong entire edges crispid. Staminodes none. Stamen one inch long, filament broadly winged pubescent, anther narrow, crest large three-lobed, median lobe much the largest oblong crisped. Style much shorter than crest ovary villous. Fruit oblong thick pubescent. Seed very large 2 or 3 only oblong  $\frac{1}{4}$  inch long smooth black.

Selangor, Dusun Tua. Negri Sembilan, Bukit Sulu; Gu-nong Berumbun.

This resembles *A. vitellinum* but has very much larger leaves broader and thicker. The bracts at the base of the inflorescence are remarkably long and narrow and the ovary very villous. The plant is known to the Malays as Pua Minyak and used in medicine, a decoction of the leaves and roots being given in fever.

*A. petiolata* Bak. l.c. 255.

Plant about 3 feet tall, leaves few elliptic oblong narrowed at the base, long acuminate glabrous about 15 inches long and four wide, petiole 3 inches long, ligule  $\frac{1}{4}$  inch long glabrous. Raceme slender pendulous, 6 inches long about 20 flowered pubescent, pedicels very short  $\frac{1}{2}$  inch long. Bracts narrowly linear  $\frac{1}{4}$  inch long or less. Calyx as long as the corolla tube  $\frac{1}{2}$  inch, 3 lobed, lobes acute, white polished glabrous, except the lobes tipped with hairs. Corolla lobes oblong linear one inch long yellowish white pubescent hooded, sub-equal. Lip flat, (not rolled up) entire obovate, edges crisped  $1\frac{1}{2}$  inch long, base pale yellowish, central barred, apex orange with red veins. Staminodes absent. Stamen filament linear oblong, anther broader, crest reniform undulate dentate emarginate, the centre fleshy deep red. Style projecting, stigma ovoid slit terminal large, ovary hispid. Fruit fusiform 2 inches long hairy.

On rocks and banks. Perak, Maxwell's Hill. Selangor, Bukit Kutu.

This has the largest flowers of any in the section, and is a rather handsome plant.

*A. macrostaphanoides* Rid. *Amomum macrostaphanum* Bak. l.c. 243.

Stem "very slender 4-8 feet." Leaves narrowly oblong, base rounded cordate, lobes very unequal, apex acuminate glabrous 2 feet long, 3 inches wide petiole slender 5 inches long. Spike "3-4 inches long" peduncle long erect enveloped in the sheath of the topmost leaf. Bracts caducous ovary villous. Calyx  $\frac{1}{2}$  inch long dilated bilobed, lobes rounded, pubescent. Corolla tube shorter slender, lobes linear minutely pubescent  $\frac{3}{4}$  inch long. Lip oblong obtuse rather narrow, a little longer edges crispid. Staminodes short linear obtuse. Stamen shorter than the lip filament rather slender, anther hairy, crest very large three-lobed lobes truncate plicate.

Perak Hills, Larut Hills. 500-1000 feet (Dr. King's Collector).

## MARANTACEAE.

This group abundant in South America is very restricted here, being represented by only 8 species belonging to two

genera. *Donax*, of which there are two species, is a tall stemmed plant much branched with ovate leaves, and slender panicles of white flowers, on zig-zag branches. *Phrynum*, is stemless, the leaves are usually large and long-stalked produced from the rhizome, the inflorescence, of simple or compound spikes, produced directly from the root stock or from the side of the petiole. There are six species.

*Phrynum variegatum* Hort, is an ornamental variety of the common arrowroot, *Maranta arundinacea* L. which has been cultivated in the Botanic Gardens Singapore for many years and was thence introduced into European Gardens, but its original home is lost.

*Donax grandis* Ridl. *Clinogyne grandis* Benth. Gen. Pl. iii. 651.  
*Maranta grandis*. Miq. Fl. Ind. Bat. Suppl. 616.

A very large plant growing 15 feet or more high with smooth green bare stems an inch through, and eight feet tall, branches clustered and jointed on a thickened portion of the stem, arranged spirally thickened at the base and spreading. Leaves ovate acute a foot long and six inches wide base rounded glabrous dark green, the large nerves distinct, petiole an inch long, sheaths six inches or more, no ligule. Racemes slender numerous hanging from the upper leaf axils, about a foot long, rachis slender zig-zag. Bracts narrow lanceolate acute. Flowers rather distant opening singly white shortly pedicelled. Sepals lanceolate acuminate  $\frac{1}{8}$  inch long white pubescent. Corolla tube  $\frac{1}{4}$  inch, lobes as long lanceolate acute. Lip yellow oblong obovate obtuse with a large ridge towards the base. Stamen petaloid oblong, cucullate one broad with a large curved side lobe, antheriferous one very narrow linear. Style short. Fruit globose white  $\frac{1}{2}$  inch long. Seed single (rarely 2) light brown globose with a groove on one side.

In woods. Common in the peninsula from Tenasserim to Singapore. Singapore, Bukit Timah, etc. Johore, Sungai Ulu Sembrong. (Lake and Kelsall) Malacca, Bukit Sedanan, Pan-chur, Tampin, Sungai Udang. Negri Sembilan. Tampin, Berumban. Pahang, Tahan river. Selangor, Caves Kwala Lumpur. Perak, Thaiping Hills, Telok Sera, Dindings. Siam, Bangtaphan

(Dr. Keith). Borneo, Rejang (Dr Haviland). "Bemban" of the Malays. The stems are used for making baskets.

*Donax arundastrum* Lour. Flor. Cochinchinensis p. 15. *Clinogyne dichotoma* Salisb. Trans. Hort. Soc. i. 276. *Phrynum dichotomum* Roxb. As. Res. XI, 324. *Maranta dichotoma*, Wall. Cat. 6614. *M. ramosissima* Wall. 6615.

Stems numerous about 8 feet tall nearly an inch through, branches dichotomous terete thickened at the base deep dull green, sheaths at the joints lanceolate persistent. Leaves elliptic base rounded apex acute, petiole thick  $\frac{1}{4}$  inch long, sheaths sub-terete no ligule. Panicle 2 to 8 inches long erect or nearly so, with few branches. Branches slender zig-zag. Bracts lanceolate involute green one inch long. Flowers white opening one at a time, two to a bract. Pedicels short with a small ochre-yellow conic gland some way below the ovary. Sepals spathulate the upper one the largest  $1\frac{1}{2}$  inch long  $\frac{1}{4}$  inch wide at the top free nearly to the base, the lower ones narrower and more acute joined to the corolla tube for half their length. Petals linear obtuse. Lip small spathulate apex rounded bilobed with a tongue-shaped process in the mouth and a line of hairs down the centre. Petaloid stamen  $1\frac{1}{2}$  inch long bilobed lobes rounded  $\frac{1}{2}$  an inch across. Antheriferous stamen adnate to lip with a slender filament and narrow anther. Cucullate stamen bilobed at the apex. Style stout stigma horse-shoe shaped. Fruit globose.

Common on river banks in thickets. It is called "Bemban Ayer." Johore, Kota Tinggi. Pahang, Pekan and a long way up the river. Kelantan, Kamposa. Selangor, Langat. Perak, Kinta river (King 831); Ipoh. It occurs also in India, Siam (Bangtaphan, Dr. Keith) and the Eastern islands. (Celebes, Dr. Koorders).

Loureiro's description might very well and even better apply to the last species, but he quotes Rumphius' picture (Herb. Amboinense Book 6, t. 7. which is evidently this species. His name *Arundastrum* is quoted in the Flora of British India as *Arundinastrum*. It is *Arundlastrum* in the two editions I have here. The plant is much smaller than *D. grande* but has larger flowers.

## PHRYNIUM.

*Ph. Griffithii* Bak. l.c. 260. *Ph. spicatum* Griff. Notulae iii. 418.  
(non Roxb.) *Hitchenia musacea* Bak. l.c. 225. *Curcuma musacea* Wall. Cat. 6596.

Plant forming very large tufts, about five feet tall. Leaves erect blade oblong subacute 2 feet long and 6 inches wide above light green beneath glaucous except along one edge quite glabrous, petioles long and slender three feet tall. Spikes from the base 4 to 6 inches long flattened on a peduncle about the same length. Bracts whitish distichous, the edges connate at the base with the points recurved cartilaginous, 2 inches long and  $1\frac{1}{4}$  broad. Flowers in pairs, each pair enclosed in a thin white oblong bract flattened and thickened on one side. Pedicel short. Calyx split nearly to the base lobes narrow acuminate acute white thin and transparent, hardly  $\frac{1}{2}$  an inch long. Corolla tube slender  $\frac{1}{2}$  inch long, lobes oblong oblanceolate blunt reflexed white nearly  $\frac{1}{2}$  an inch long. Stamen tube little longer than corolla tube, the petaloid stamen is so deeply cleft as to appear to be two organs each lobe is spatulate with a claw with two involute edges and a broad expanded limb. Cucullate stamen rather narrow, the apex of the hood rather acute, the lateral lobe short and blunt, the edges yellow. Lip oblong obovate blunt rather fleshy the crest not transverse as usual but almost parallel with the line of the lip short thick and tongue-shaped, a long hairy ridge runs along the lower part of the lip in the same direction. Style very stout rounded on the back and doubly grooved in front. Stigma depressed almost funnel shaped. Capsule an inch long, fawn-colored back rounded front keeled, 2 seeded, seed oblong with the back rounded and front flat, a small irregular white aril at the base.

Dense woods. Singapore, Bukit Timah, Jurong, etc. Johor, Gunong Panti, Malacca, Bukit Bruang. Negri Sembilan, Bukit Tampin. Pahang, Tahan river.

A common plant in the South. The flowers have a very sweet scent.

*Ph. cylindricum* n. sp.

A large tufted plant in the habit of *P. Griffithii*. Bak.

Leaves about six feet tall, blade oblong ovate base broad two feet long and 8 inches wide glabrous green above whitish beneath, petioles four feet long. Scapes rather slender about 8 inches long, spikes narrow fusiform six inches long. Bracts pale green ovate oblong truncate glabrous apices erect not recurved, reflexed and spreading in fruit. Flowers white, corolla tube  $\frac{1}{4}$  inch long, lobes oblong. Lip fleshy ovate acute sides turned up. Cucullate stamen short truncate with a process on the side, white tipped with yellow. Petaloid stamen hooded, antheriferous one very narrow linear. Style stout.

Perak in the Kinta valley on the limestone rocks at Ipoh, and Kwala Dipang.

Closely allied to *P. Griffithii* but readily distinguished by its much more slender cylindric spikes.

*Ph. jagoranum* Koch. Wochenschrift. VI (1863) p. 358.

Rather a small kind often forming masses on the ground. Leaves solitary or two or three, the blade 6 to 7 inches long, oblong cuspidate 3 inches across, glabrous except the midrib on the back which is pubescent, grey green with darker patches running from the midrib above, or entirely light green, petiole 8 or 9 inches long slightly flattened upwards, the swelling below the blade pubescent. Flower spike from the root stock 2 inches long fusiform slender on a terete peduncle an inch long. Bracts about 4 green lanceolate acute. Flowers in pairs. Sepals lanceolate acuminate acute inch long green. Corolla tube long slender dilated upwards  $\frac{1}{2}$  an inch long white, lobes short oblong yellow. Stamen tube no longer than corolla tube. Cucullate stamen nearly entire hooded oblong with a lateral process apex orange, anther-bearing one petaloid with a rounded lobe on a linear base, anther on a narrow lateral lobe; petaloid one narrow linear oblong. Lip more fleshy oblong rounded edges incurved, glabrous, with a rounded process on one side on the inner face and a narrow linear lobe outside. Style very stout thickened in the middle. Capsule oblong oblique crustaceous green 2 seeded inch long. Seeds elliptic oblong with a rounded back and flattened and grooved ventral surface brown polished, the aril at the base oblong reddish with two long curved claws.

Selangor, Dusun Tua; and near Kwala Lumpur.

I have also I believe seen the plant in Malacca. The foliage is prettily marked and resembles that of some of the South American Calatheas. The flowers are not often produced and are very inconspicuous. The seeds have a very odd appearance, resembling some curious beetle, the seed itself representing the body, and the claw-like arms of the aril the legs of the animal. The plant was first described from living plants sent to Bertin from the Malay peninsula by Professor Jagor.

*Ph. tapirorum* Ridl. Trans. Linn. Soc. iii. 382.

A large tufted plant about six feet tall, leaves ovate, lanceolate blade 18 inches long, 8 inches wide, acuminate green. Spikes in a tuft from the side of the petiole with a stout peduncle two or three in a tuft about 4 inches long, with numerous ovate lanceolate brown bracts. Flowers white on short peduncles, 3 in each bract, an inch long. Bracteoles 2 thin bifid. Sepals linear subulate more than half an inch long. Corolla white tube curved dilated upwards rather thick, lobes oblong, apices rounded blunt recurved. Capsule oblong obtusely 3 angled  $\frac{1}{2}$  inch long, three celled with a seed in each cell. Seeds narrow oblong.

Selangor at Ginting Bidai. Pahang, Tahan River.

The tuft of long spikes projecting from the side of the leaf stalk distinguishes this from any of our other species.

*Phrynum malaccense* n. sp.

A large tufted plant. Leaves tall about 3 feet, petiole terete glabrous, except at the base 8 inches long  $\frac{1}{4}$  inch thick, blade 15 inches long, 5 inches wide, lanceolate cuspidate dark green above, glaucous green beneath, nerves very close and numerous, midrib thick covered with brown fur, otherwise glabrous. Head lateral from the petiole dense 2 inches across, with about 4 branches. Bracts lanceolate acute stiff hard green glabrous  $1\frac{1}{2}$  inch long,  $\frac{3}{4}$  inch wide. Flower spikes 5 or 6 on each branch, with 2 or 3 flowers in each spike. Bracteole lanceolate acute 1 inch long green. Flowers small fugacious, shortly stalked, stalk  $\frac{1}{4}$  inch long. Calyx tube very short lobes lanceolate acute white hispid nearly as long as the corolla tube. Cor-

olla tube dilated upwards, lobes ovate blunt, recurved finely spotted with purple. Lip thin spathulate oblong, white with a transverse pink line across the apex. Stamens, the cucullate one falcate spathulate white the hood edged with yellow, the petaloid one obovate bilobed rounded white, the antheriferous one linear erect short. Style thick flattened behind. Stigma ovoid, ovary orange covered with white hairs. Capsule one to three angled cordate in outline a little over  $\frac{1}{4}$  inch long red hairy. Seeds oblong angled black covered with a semi-transparent aril.

Common in woods in the hilly districts of the peninsula. Malacca, Bukit Danan, Panchur. Negri Sembilan, Bukit Muar. Selangor, Caves Kwala Lumpur, Pataling. Dindings, Gunong Tungul. Perak, Maxwell's Hill. Pahang, Tahan Woods.

This is allied certainly to Roxburgh's *P. parviflorum*, with which it has been confused, but that has yellow flowers, and only one seed in the capsule.

*Ph. hirtum* n.sp.

A plant forming fairly large tufts. Leaf stems stout 3 or 4 feet tall, blade broadly oblong with a broad base, apex acute 15 inches wide, 8 inches across, glabrous dark green young leaves with the backs red. Petiole 15 inches long, stout sheath near the inflorescence woolly. Head of flowers three inches through. Bracts oblong  $1\frac{1}{2}$  inch long apex, broad truncate broken up into fibres. Bracteoles lanceolate acuminate acute glabrous. Peduncles nearly  $\frac{1}{4}$  inch long. Flower  $\frac{3}{4}$  inch long (white). Calyx sepals free almost to the base longer than the corolla linear lanceolate acuminate hispid. Corolla tube rather slender, lobes oblong lanceolate acute tipped with hairs. Lip oblong small. Stamen, cucullate with rather a long lateral process. Style very stout. Capsule globose obscurely three lobed glabrous  $\frac{1}{2}$  an inch long. Seeds 3 large, the backs rounded sides straight and smooth.

Johore, Gunong Panti. Sungei Ujong. Selangor, Dusun Tua. Perak, Hermitage Hill; Ulu Kerling (King's collector). Penang, Government Hill (Curtis 2420).

A much stouter plant than *P. malaccensis* with larger leaves, hairy leaf sheath, and very different fruit.

*Ph. basiflorum* n.sp.

Rhizome rather long, leaves in a tuft on a very stout woolly stem, about 4 feet long, oblong base broad, apex cuspidate glabrous except margin hispid, finely striate. Capitulum large 3 inches through from the base of the stem between the leaves dense many flowered. Lowest bracts woolly inner bracts glabrous oblong lanceolate. Flowers in pairs. Calyx lobes free to the base linear setaceous  $\frac{3}{4}$  inch long. Corolla tube a little longer lobes oblong lanceolate dark pink  $\frac{1}{2}$  an inch long. Lip white ovate oblong broad  $\frac{3}{8}$  inch long and broad, ridge large elevated rounded. Stamen narrow linear, ovary pubescent.

Negri Sembilan. Woods in Perhentian Tinggi, growing in large masses in damp spots.

## CANNACEÆ.

*Canna indica* var. *orientalis* and *C. Warscewiczii* have established themselves in Kampongs and waste ground near towns in Singapore and a few other spots, but have no claim to be considered native anywhere in the peninsula.

## MUSACEÆ.

The genus *Musa* is the only one of this group represented here, though farther east from Amboina to New Ireland are various species of the genus *Heliconia* several of which are cultivated in our gardens. The general form of the Banana is so well known that it is unnecessary here to give a special description of it. Three and probably more wild kinds occur in the peninsula, one of which *Musa Malaccensis* appears to be the parent of some of our cultivated bananas.

*M. Malaccensis* Ridl. Trans. Linn. Soc. iii. p. 383.

Stems rather slender about 10 feet tall and 6 inches through. Leaves about 8 feet long green, often barred with brown when young. Spike decurved rachis covered with brown hairs. Bracts lanceolate sub-acute brown. Male flowers  $1\frac{1}{2}$  inch long curved white. Calyx boat-shaped with five teeth. Petal oblong white  $\frac{3}{4}$  inch long. Stamens with flattened filaments and narrow anthers. Female flowers 16 in a row. Stamens  $\frac{1}{2}$  an inch long abortive. Style thick, an inch long. Fruit sub-

cylindrical four inches long yellow. Seeds black angled, enclosed in an eatable pulp.

Common all over the main chain of the peninsula. Malacca, Selangor, Perak, Pahang.

*M. flava* Rid. l.c.

Leaves large 16 inches across green. Spike decurved pubescent. Bracts widely ovate obtuse 4 inches long, bright yellow. Male flowers 16 in each bract arranged in two rows much like those of the preceding. Females also 16 in two rows. Fruit about 2 inches long, five angled.

Pahang at Pulau Tijau, Pahang River.

The very blunt spikes with yellow bracts distinguish this rare kind readily.

*M. violascens* Rid. l.c. 334.

Stems 8 to 10 feet. Leaves 10 inches across transversely ribbed and whitish beneath. Spike erect or nearly so, apex acute. Bracts lanceolate narrow acute violet or white tinted with violet, nine inches long and 2 inches wide, often persisting and reflexed after the flowers have fallen, rachis pubescent. Male flowers 6 in a single row in each bract, about an inch long. Females also 6 in a row. Fruit 3 inches long green, uneatable seeds  $\frac{1}{4}$  inch long cylindric.

Common all over the main chain of the peninsula, often growing with *M. Malaccensis*. Pahang, Perak, Selangor, Sungai Ujong.

Easily recognized by its acute erect spikes with bracts colored like a purple brinjal.

LOWIACEAE.

A small group of plants forming a single genus *Lowia*, very unlike any other *Scitamineæ*, being stemless with broad dark green leaves like those of a *Susum*, and a short prostrate panicle of flowers from among the leaves. The flowers are medium size or large with a long almost solid calyx tube three long calyx lobes, two very small petals and a large obovate lip, five very short stamens, and a short stout style ending in a three-armed stigma. Capsule large, fusiform acute with numerous flask-shaped pubescent seeds.

There are two species in the peninsula and one in Borneo.

*L. longiflora* Scortechini, Nuov. Giorn. Bot. Ital. 1866, p. 308.

A large plant forming great tufts with erect dark green lanceolate acute leaves, about 3 feet long and 4 inches wide tapering into the petiole. Flowers axillary enclosed in long sheaths solitary large. Calyx tube long, sepals 5 inches long and one across narrow linear acute purple. Petals one inch long yellow linear acuminate apex setaceous. Lip spatulate the limb ovate, 4 inches long and 2 inches across lilac. Stamens as long as petals, filaments short curved, rather thick, anthers. Style long and slender, longer than the stamen. Stigma arms linear with numerous processes at the ends.

Selangor, Ulu Langat, near the caves Kwala Lumpur. Perak, Ipoh.

This plant is exceedingly abundant in some places, forming great masses, usually in wet spots, but growing also in drier ones. It is however rare to find flowers, and I have only found them on plants which have been injured. They are not very conspicuous, being usually concealed among the leaves. It is known as "Lobak hutan" in Selangor.

*L. maxillarioides* Hook fil. Bot. Mag. t. 7351. *Protamomum maxillarioides* Ridl. Trans. Linn. Soc. iii. 383.

A smaller plant with numerous leaves in a tuft arranged distichously, lanceolate acuminate 8 inches long and 3 inches wide bright green, petiole 2 feet long sheathing at the base, often shorter. Panicle axillary about 3 inches long with a few shorter branches. Calyx tube purple 3 inches long, lobes (sepals) lanceolate acute deep purple spreading  $1\frac{1}{4}$  inch long. Petals two very small oblong mucronate violet. Lip with a short claw, oblong obtuse white tinted with violet. Stamens short, filament thick curved, anthers but little longer. Style thick and short. Stigma large (in proportion) subcordate with three short toothed arms. Capsule large  $1\frac{1}{2}$  inch long, fusiform pointed three angled, deep purple. Seeds  $\frac{1}{4}$  inch long, flask-shaped brown, covered with short hairs.

Pahang, Pulau Tawar Woods.

Abundant there but I have never seen it elsewhere.